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THE WORLD  
GENERAL GEOGRAPHY FOR INDIAN SCHOOLS



LONGMANS' NEW GEOGRAPHICAL SERIES FOR INDIA

# THE WORLD

A GENERAL GEOGRAPHY FOR INDIAN  
SCHOOLS

BY

L. DUDLEY STAMP

B.A., D.Sc. (LONDON), F.R.G.S.

*WITH 10 COLOURED MAPS  
AND 419 DIAGRAMS AND ILLUSTRATIONS*

FOURTH EDITION

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## PREFACE

The principal object of this book is to provide for the schools of India, Burma, and Ceylon a text-book which shall cover the High School Geography course in one volume. It may perhaps be said that there is already a superabundance of geography books in use in the High Schools of India. Many of those books, though excellent in their day, fall far short of the requirements of modern Geography. Geography has ceased to be a collection of meaningless facts, to be learnt parrot-wise and reproduced when required. Many of the other books now in use are really excellent modern text-books, but they were written primarily for boys and girls in the British Isles and everything is treated, it may be unconsciously, from that standpoint. Moreover, the language is often difficult for boys and girls whose native tongue is not English.

It is hoped, therefore, that teacher and pupil alike will find in this book a text-book of Geography, written in simple English, embodying the outlook and methods of modern geography, but written from the Indian standpoint and covering all that is necessary for the High School Syllabuses of the various Provinces and States of India.

Readers are asked not to be frightened by the fact that this book contains 647 pages. There are no pages in small type; pictures and maps take up about 250 pages. Actually every attempt has been made to eliminate superfluous detail. The greatest stress must be laid on the maps in this book. For the past three years the writer has attempted to impress upon the geography teachers of Burma the importance of sketch-maps, and

how that it is the teacher's duty to take an ordinary map, simplify it, and convey the main features to the class, to be mentally photographed by them for reproduction as a sketch-map. In this book ordinary maps have, for the most part, been eliminated. In practice, in every case the maps have been specially drawn to illustrate just the salient features of the matter under consideration in the text. The rainfall maps, for example, rarely show more than two rainfall lines; on many of the temperature maps just one, the most important temperature line has been shown. It is considered, therefore, that each pupil should be able to understand, memorise, and reproduce each map in this volume. At least half of each lesson should be devoted to the study of the maps or diagrams.

The teacher will observe that roughly the first third of the book is devoted to what is usually called physical geography. The writer believes that it will be found better to work straight through the book, so that the greater part of the first year of the High School course will be devoted to physical geography and the broad aspects of world geography; whilst the second and third years can be devoted to the application of these principles in regional geography. But opinions on this point vary widely even amongst experts, and the teacher is at liberty to teach concurrently the physical and regional geography. For example, alternate lessons may be taken from Part I and Part II. It may be mentioned that the scheme on which this book is based has been used in Burma for several years, and that the sequence followed seems to the writer the most logical one. It is obviously much more difficult for the pupil to absorb the details of regional geography until the broad principles of world geography have been properly grasped. During the past few years the writer and his wife have examined many thousands of public examination answer books of all stages from Middle School to B.A.—the work of candidates of most of the varied races in India. Experience.

and, in this way has been most valuable, and the writer has come to believe that physical geography might merely as a subsidiary during the course of general geography is not sufficiently impressed upon pupils' minds.

The facts upon which this book has been based have been obtained mainly from official publications—not forgetting that invaluable compendium of official information, the "Statesman's Year Book." The writer has been much helped in the clothing of these dry bones by personal experience. During the writing of this book he writer has been resident for the most part in India and Burma, but visits for purposes of study have been made to each of the five continents. The spelling of place names is, as far as possible, that advocated by the Permanent Committee on Geographical Names of the Royal Geographical Society. Some of the maps were prepared before the P.C.G.N.'s lists were available, and hence a few variations may be observed. This is not the place to discuss the desirability of an extended use of national spellings of place names, but the writer cannot help believing the pupil would be greatly helped by the use of a set of characteristic names such as Torino, Milano, Genova, Roma—suggesting Italy by their very form—rather than by conventional Turin, Milan, Genoa, and Rome—both featureless and unsuggestive.

A departure from the usual practice is the use, almost exclusively, of simplified actual temperature maps. The writer has found it so difficult to explain why the isotherm map of Asia for July should show the baking hot plains of the Punjab and the cool heights of Kashmir with the same temperature, that he has come to doubt the advisability of many isotherm maps. Hence the simplified actual temperature maps in this book, which, after all, show things as they really are.

In the later stages of the work much assistance has been derived from the Chambers of Commerce Atlas. Unfortunately that atlas was not available when many

of the distribution maps were prepared, and all of those of India were compiled from official statistics.

Finally, this book has benefited greatly from the careful scrutiny and suggestions of the writer's ever-willing colleague and helpmate—his wife. Many of the questions have been prepared by her.

L. D. S.

*Rangoon, 1926.*

The call for a new edition of this book has enabled me to revise it throughout and also to rewrite part of the section on the atmosphere, and thereby to incorporate some of the results of recent researches in meteorological science. I am indebted to Professor E. G. R. Taylor for a number of suggestions. The sections on Canada, Australia and New Zealand have been completely rewritten.

L. D. S.

*London, August, 1929.*

In this new edition, prepared during Dr. Stamp's absence abroad, numerous textual revisions have been made, notably in the sections on the British Isles, North America and Africa; and a number of new developments in various parts of the world have been noted. Several maps of parts of Africa have been redrawn to show the remarkable railway developments of recent years.

A section on the new republic of Manchukuo has been added.

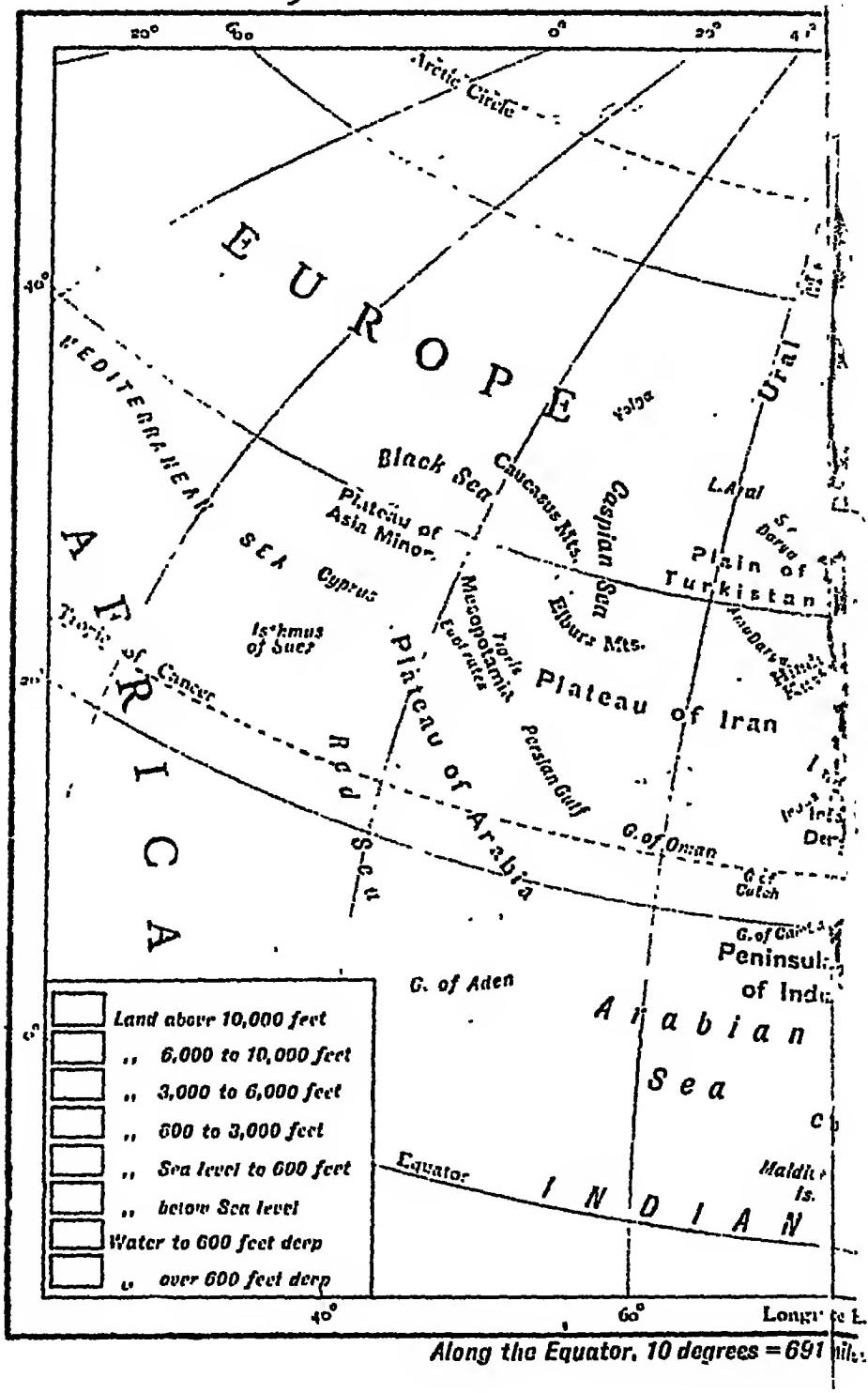
S. H. BEAVER.

*June, 1934.*



Scale: 1 inch = 960 miles

ASI



## ASIA physical

English Miles

*Latitude of 20°. 19 degrees = 650 miles*

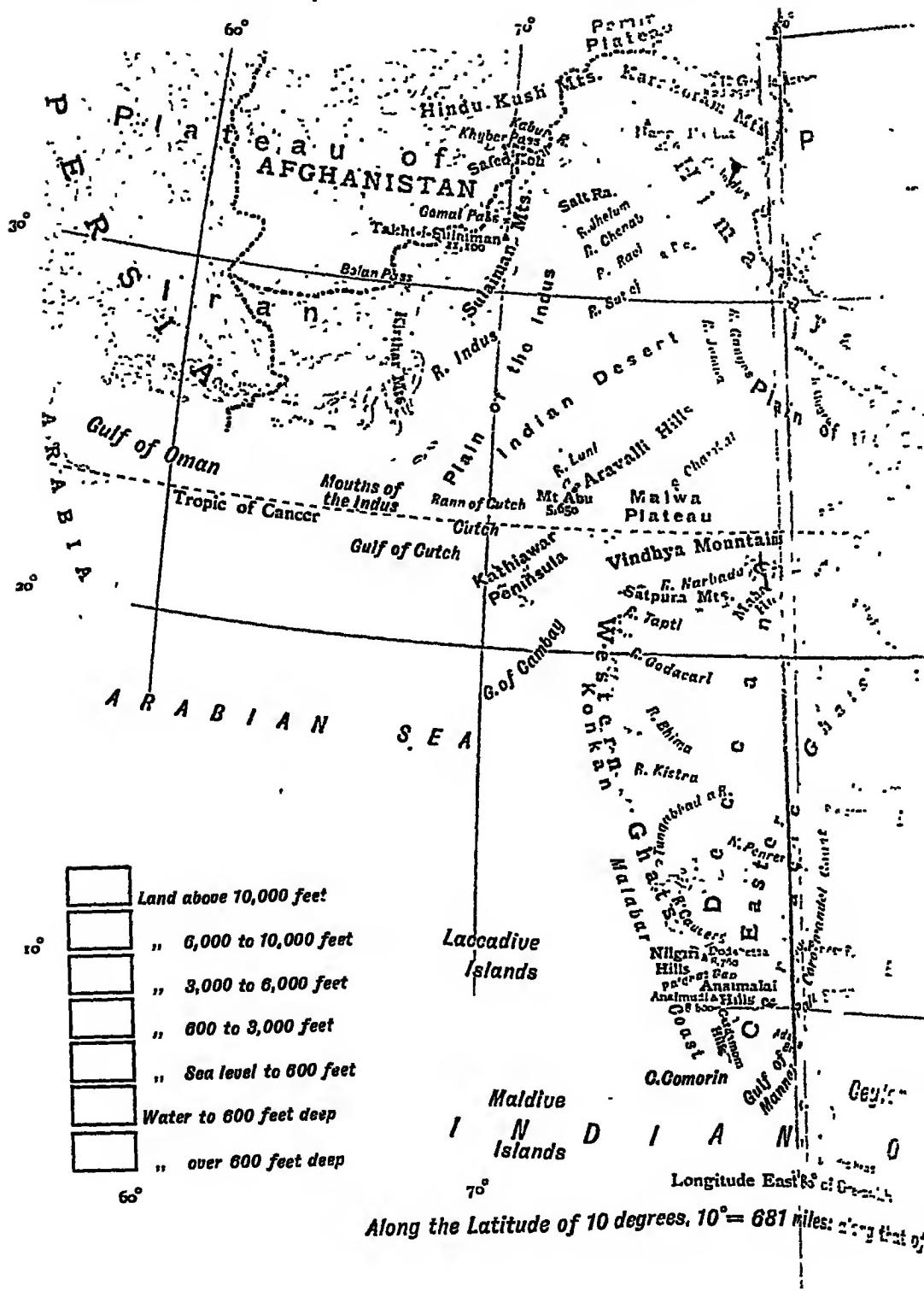
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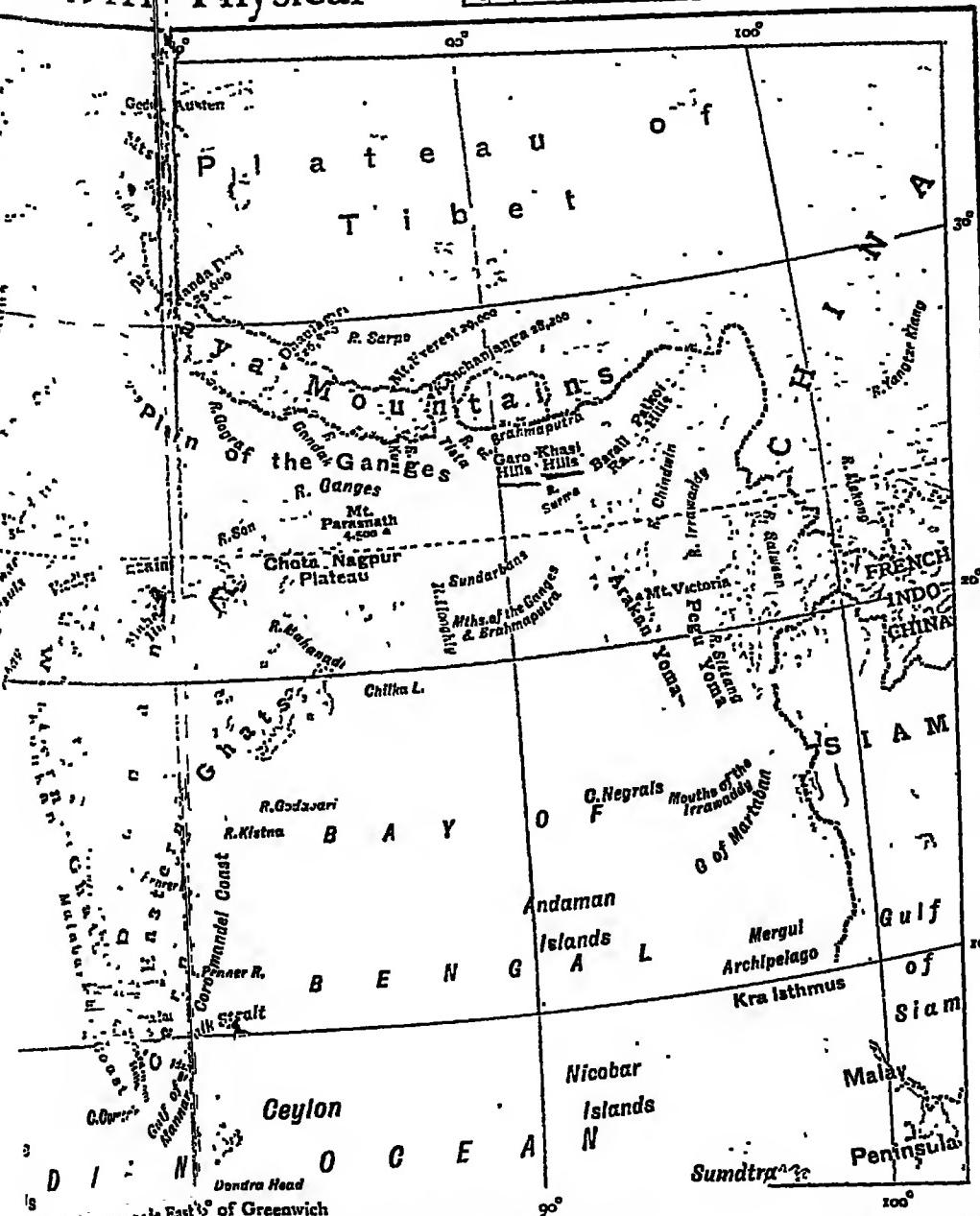


Scale: 1 inch = 400 miles

# INDIA - Phuket



## **E-DIA**: Physical



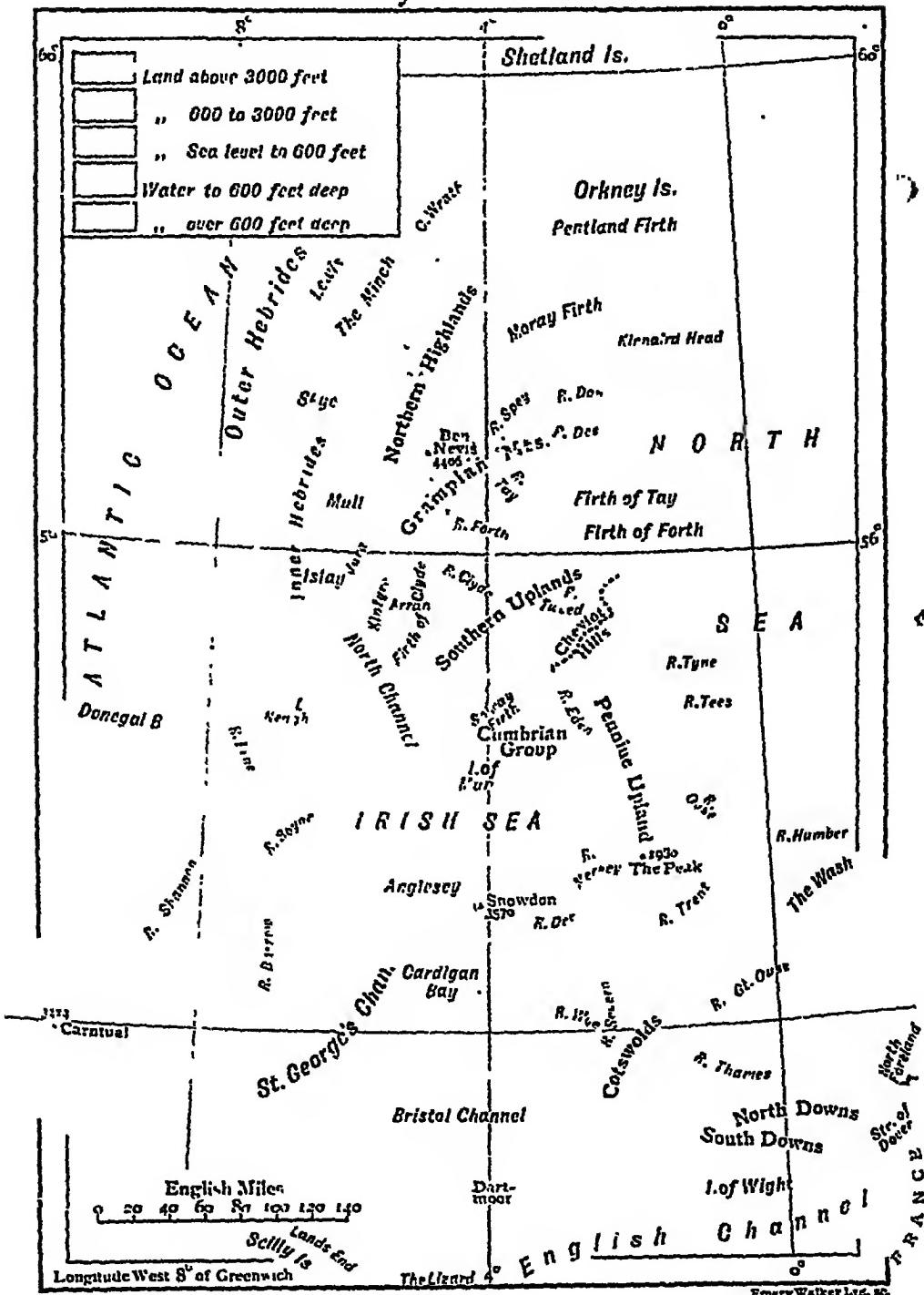
$\therefore 10^\circ = 681 \text{ miles; along that of } 80 \text{ degrees, } 10^\circ = 599 \text{ miles}$



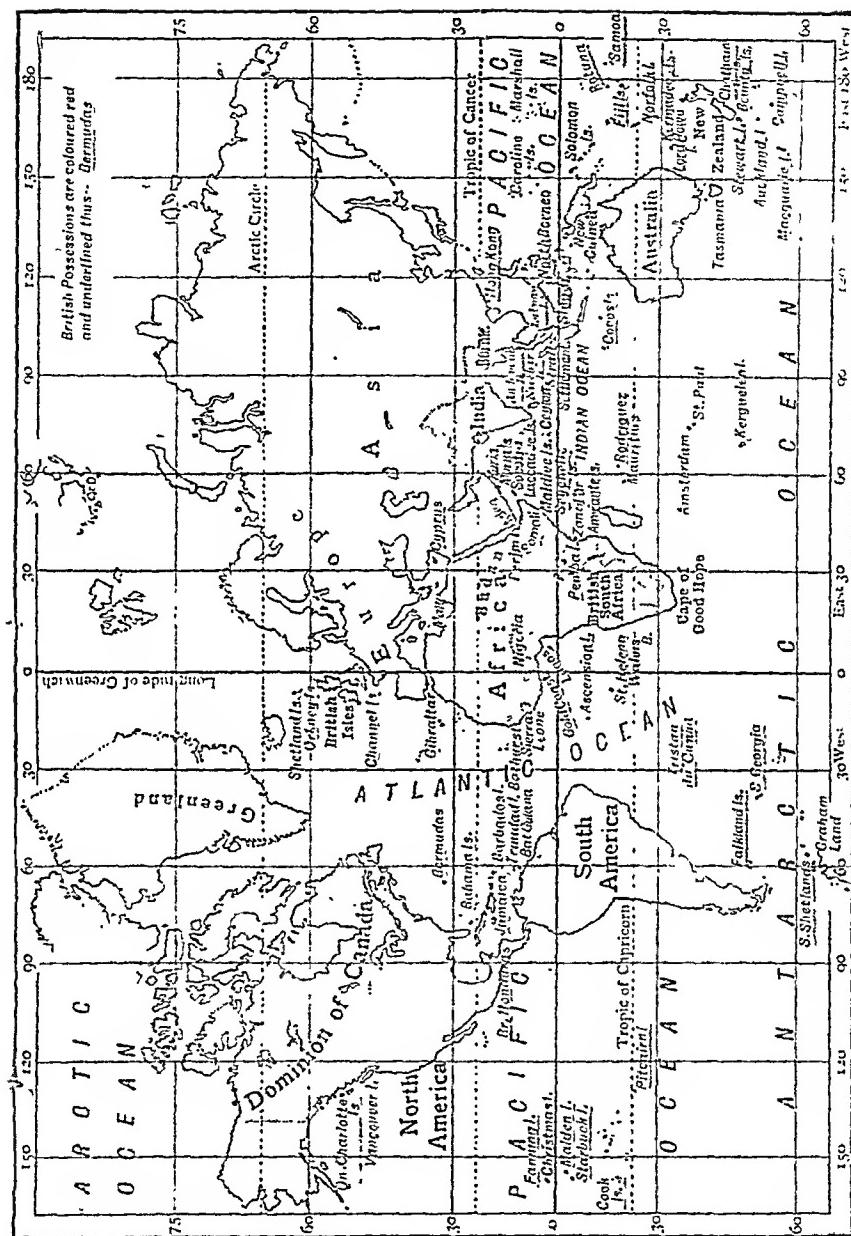


**BRITISH IS.-Physical.** Scale: 1 inch = 120 miles

Scale: 1 inch = 120 miles



*British Possessions are coloured red  
and underlined thus:- Bermudas*



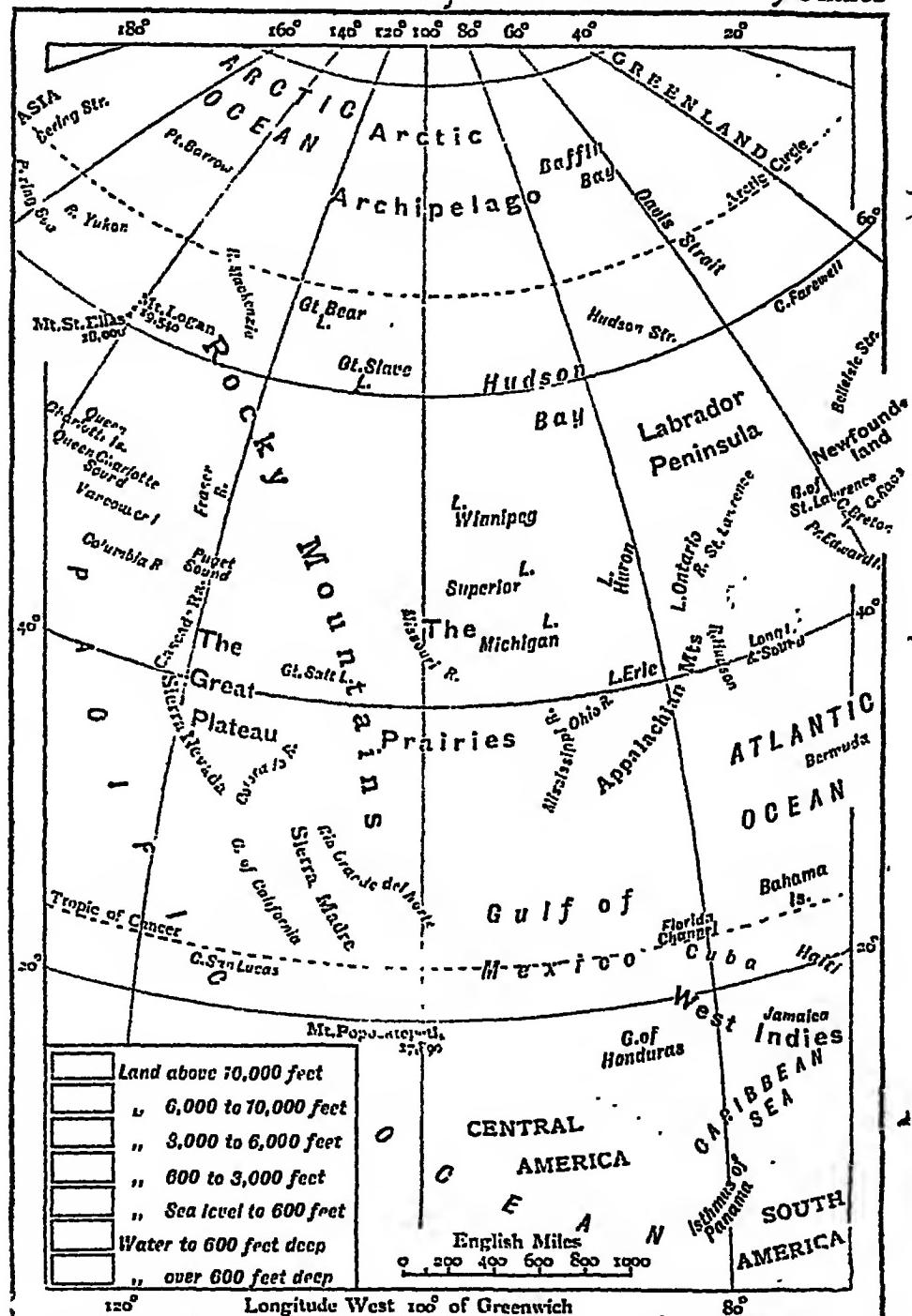
THE WORLD - showing British Empire (Mercator's Projection)





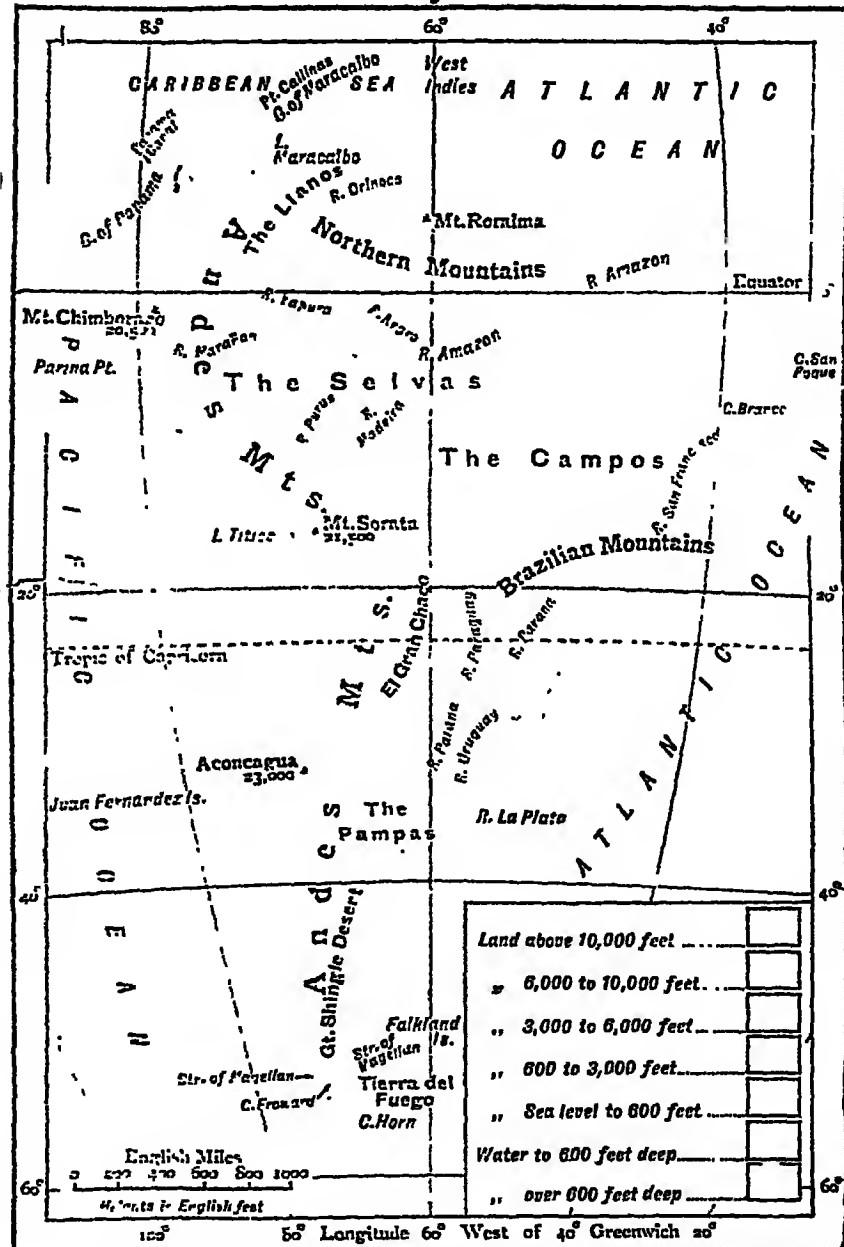
**NORTH AMERICA - Physical**      Scale: 1 inch = 960 miles

Scale: 1 inch = 960 miles



*Along the Latitude of 20° degrees, 70° = 650 miles: along that of 60° degrees, 10° = 340 miles*

SOUTH AMERICA - Physical. Scale: 1 inch = 960 miles



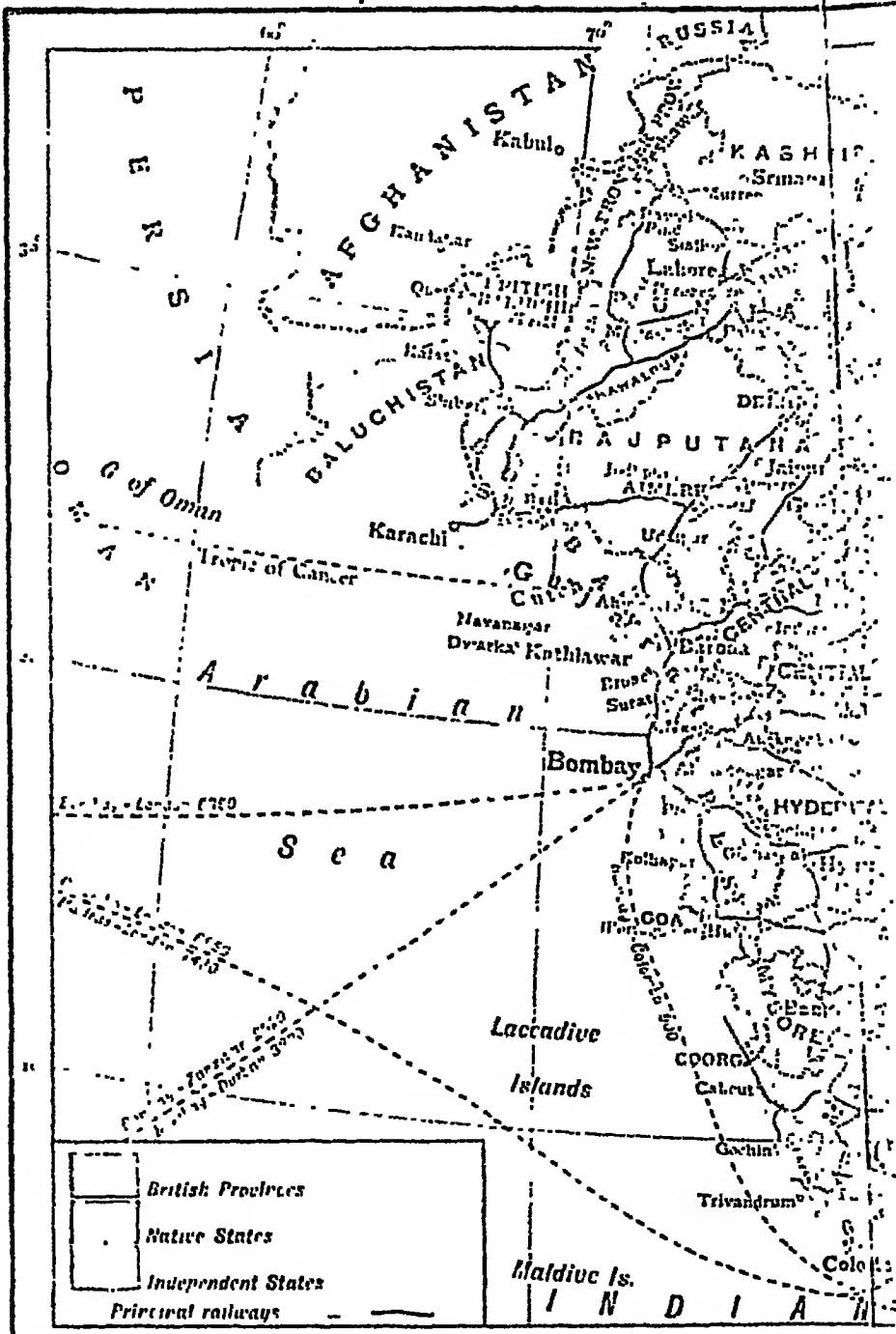
Along the Equator, 10 degrees = 691 miles; along Latitude of 40°, 10 degrees = 530 miles





Scale: 1 inch = 400 miles

INDIA

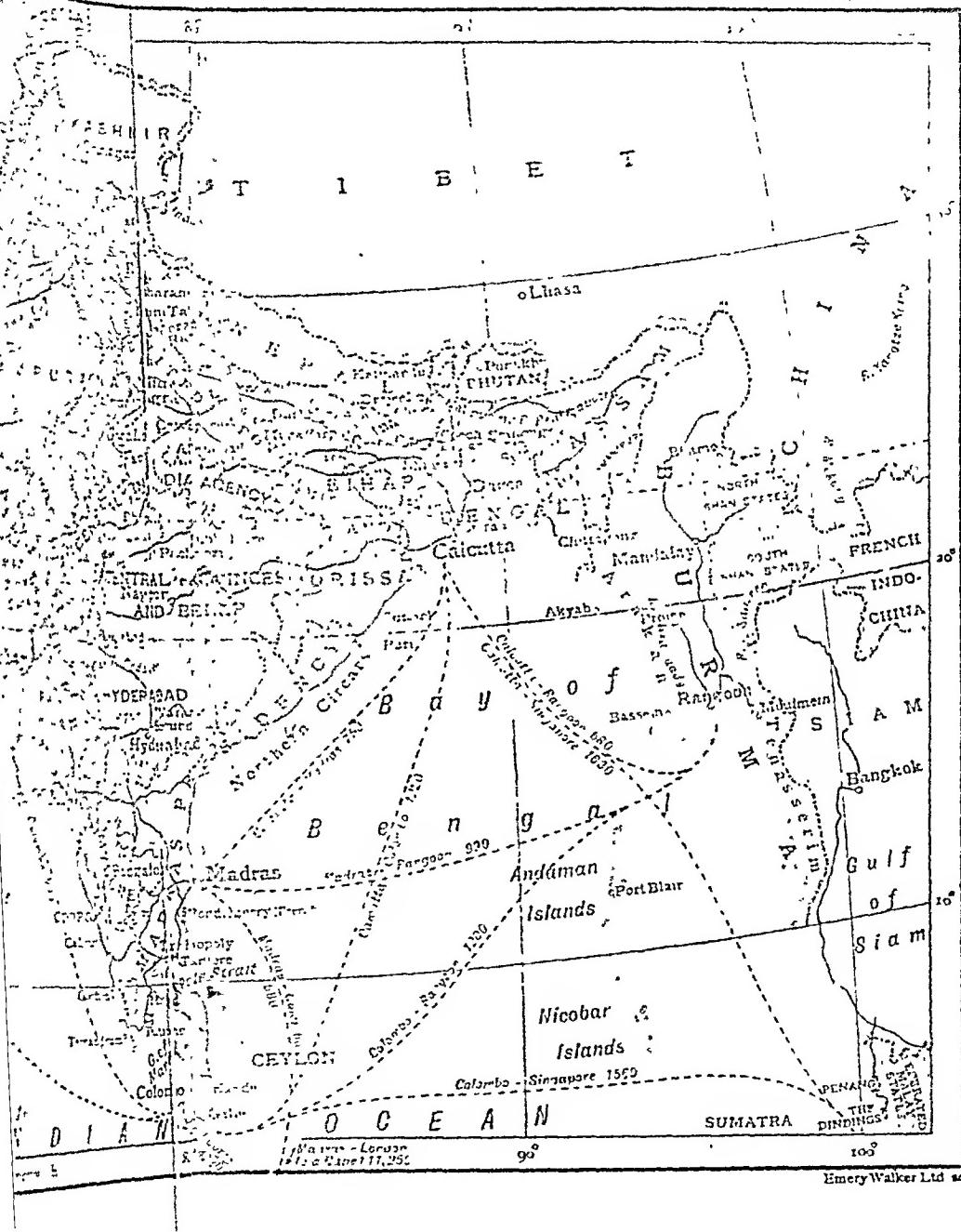


Distances on Steamer routes are in Nautical miles

Longitude East 70° of Greenwich

# INDIA - Political

English Miles  
0 50 100 150 200 250 300 350 400 450 500





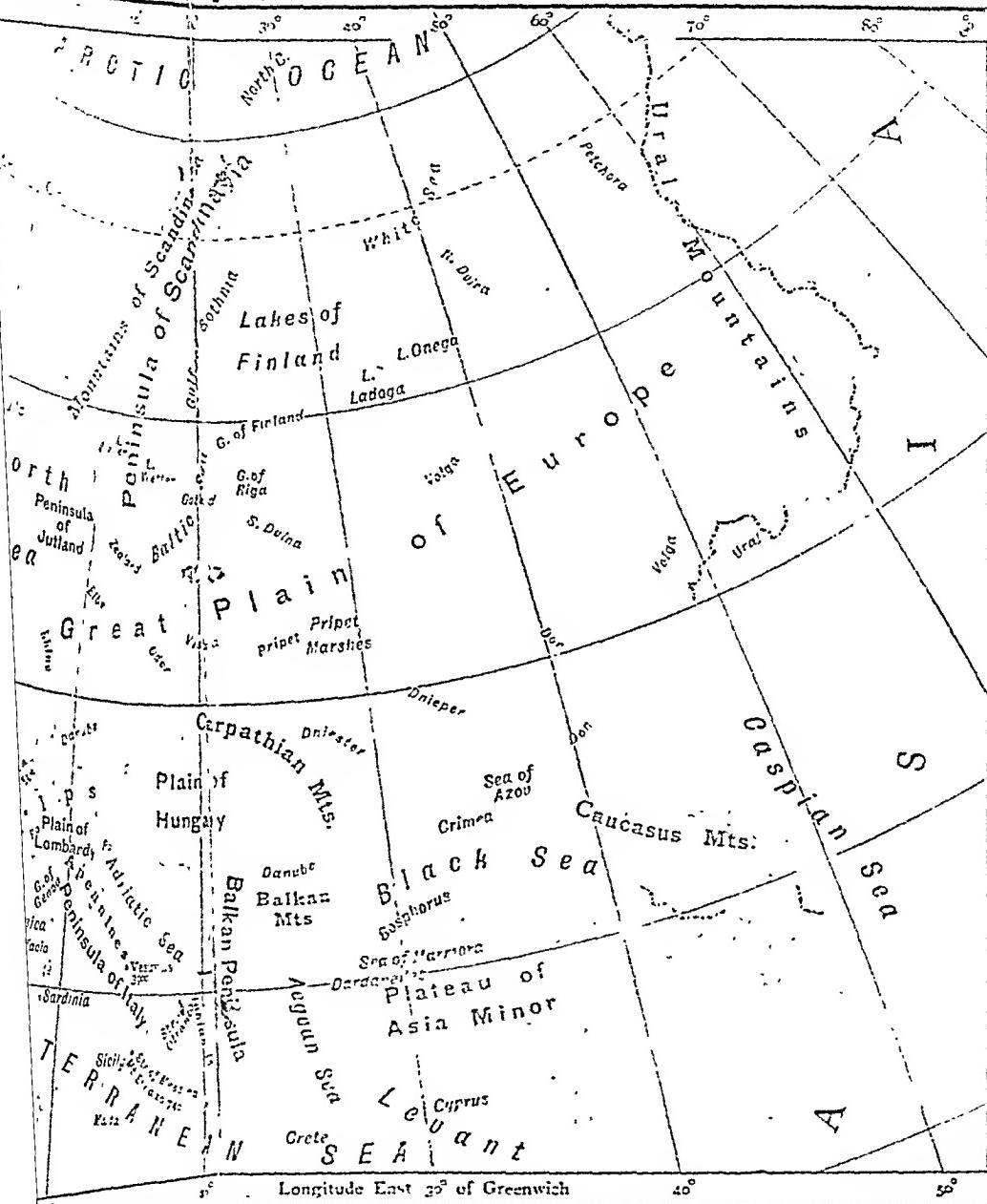




# EUROPE - Physical

English Miles

0 100 200 300 400 500 1000



10 degrees = 530 miles; along the Latitude of 60°, 10 degrees = 346 miles

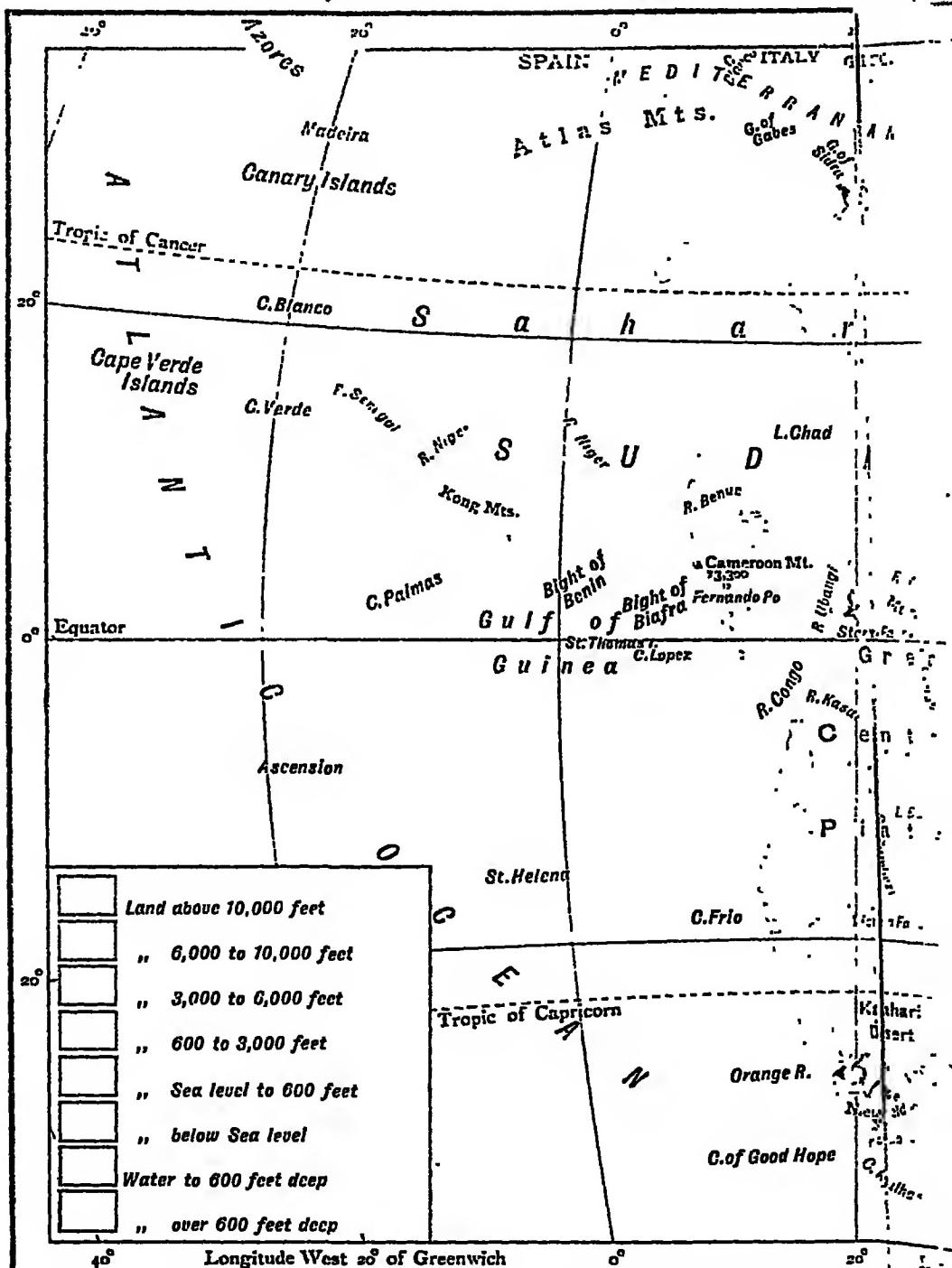
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Scale: 1 inch = 960 miles

AFRICA PH.

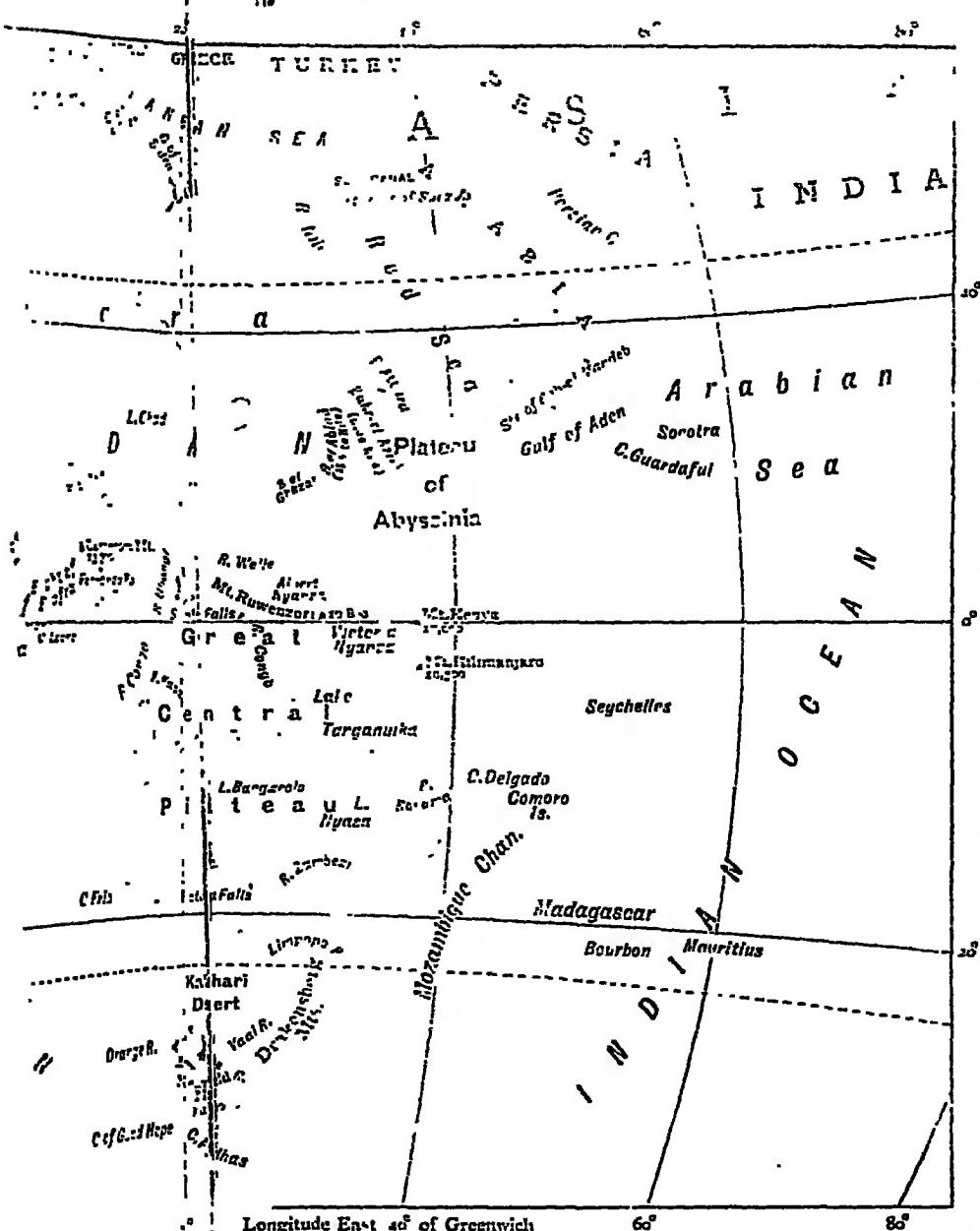


*Along the Equator, 10 degrees = 691 miles: Along the L.*

## AFRICA | Physical

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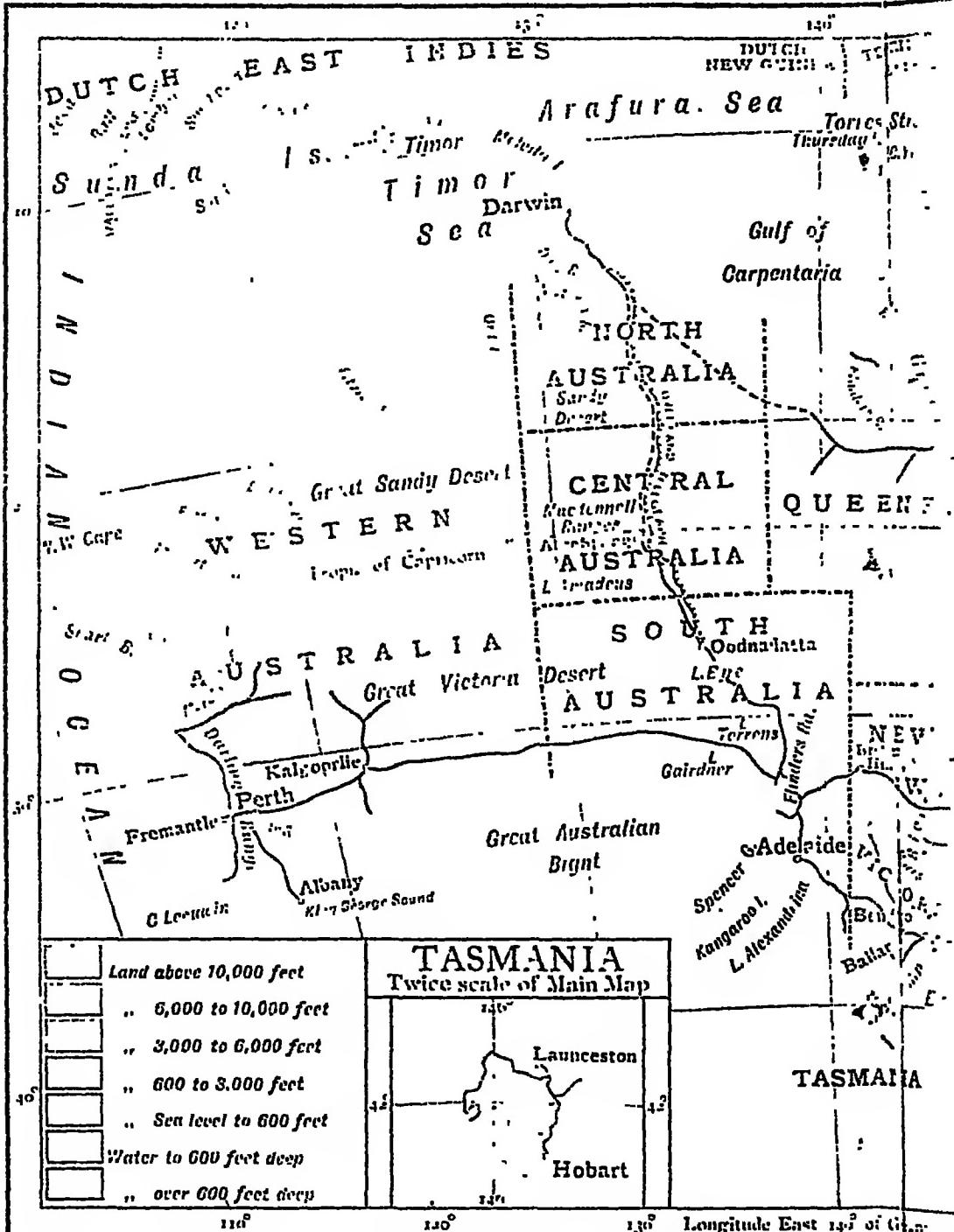
$\text{Distance} = 691 \text{ miles} : \text{Along the Latitude of } 20^\circ, 10 \text{ degrees} = 650 \text{ miles}$

Emery Walker Ltd. sc.



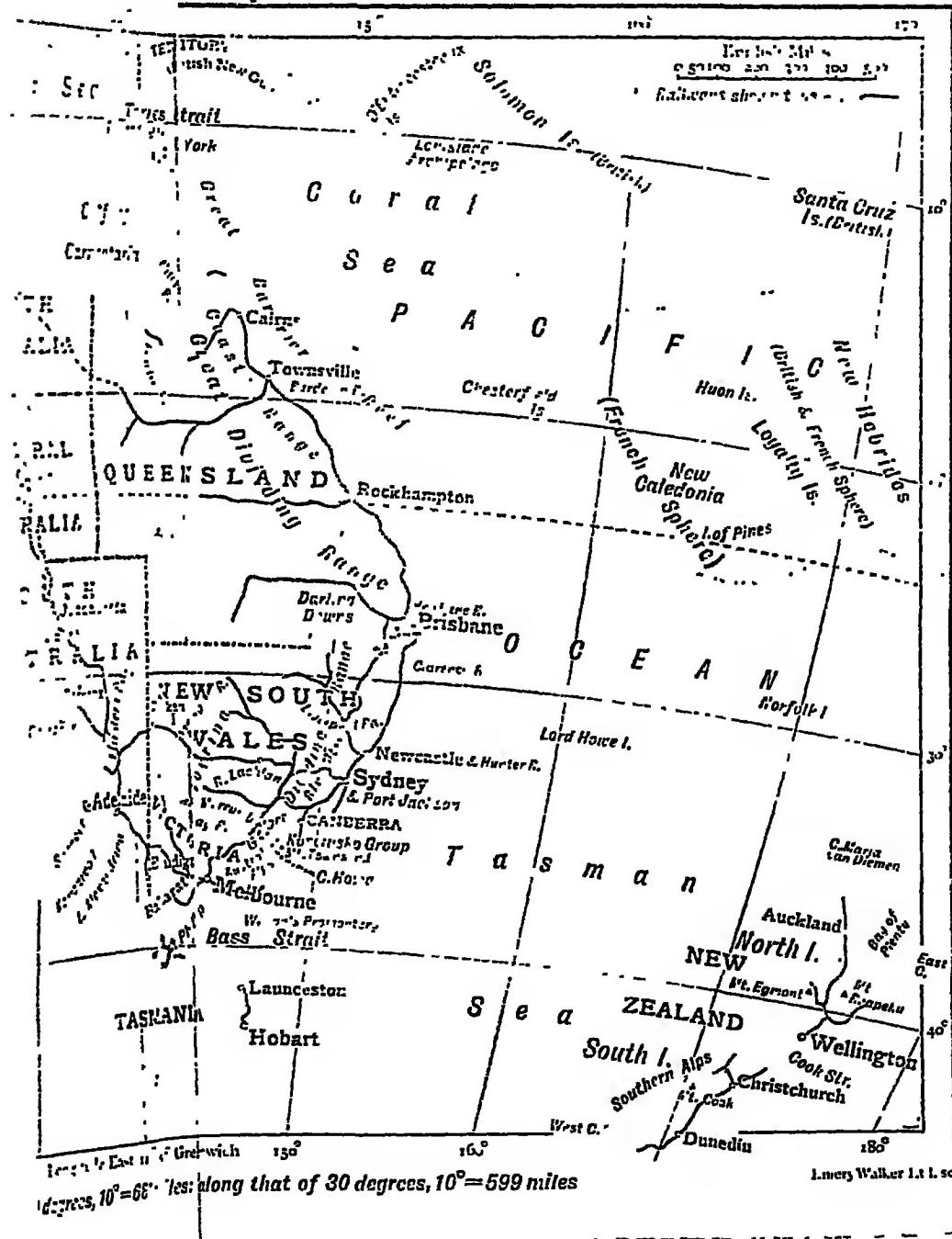


# AUSTRALIA and NEW ZEALAND



Along the Latitude of 10 degrees, 10° = 681 miles; al:

# AUSTRALIA AND NEW ZEALAND-Physical & Political. Scale: 1 inch = 480 miles



1 degree = 69 miles; 10° = 690 miles; 10° = 599 miles

Linen Walker Ltd. sc



# THE WORLD

## PART I

### GENERAL PHYSICAL AND WORLD GEOGRAPHY

#### A. MATHEMATICAL GEOGRAPHY

##### THE SHAPE OF THE EARTH

A Flat Earth.—In the past men used to think that the earth was flat. Thousands of years ago the wise Greeks knew that it was not; hundreds of years ago men first sailed right round the earth in ships, and so proved that it was not. In the present century it is very common for people to travel round the earth. In the cool season, Rangoon, Calcutta, Colombo, and Bombay are visited by great steamers carrying people on a tour round the world. All these steamers go round the earth in an east and west direction, but it is also possible to go round in a north and south direction. That is much more difficult, because we have to pass through the very cold Arctic and Antarctic regions, and only a few brave men have been able to penetrate into the heart of those cold lands.

Before we can start learning geography we must be quite sure that we understand the shape of the earth—that it is a big sphere or ball and that we can go round it in any direction. Unless you quite understand this, it is useless to attempt to learn any geography.

Proofs that the Earth is a Ball.—There are many ways of proving that the earth is a sphere. Here are some :

(a) As we have said already, it is quite easy to travel right round the earth. We can start from Rangoon or Calcutta, Madras, Colombo or Bombay, or any of the big ports of India, and take a steamer through the Suez Canal into the Mediterranean Sea, right across the Atlantic Ocean to the Panama Canal in America, through the Panama Canal, across the Pacific Ocean to Japan, and back to India in the same steamer, coming from Japan by way of Singapore. In whatever direction we travel round the earth we do not find sharp edges such as we should do if the earth were flat or were shaped like a rupee coin.

(b) We can actually see with our own eyes and measure the curvature of the earth. We always think of a great expanse of water—such as a calm sea—as being flat, but in reality it curves gradually with the earth. If we choose an area where the sea is smooth and shallow, we can take three poles and drive them into the sea bottom so that in each case exactly the same length of pole appears above the surface of the water. The three poles must be in a straight line, and then if we look from the top of the first to the third through a telescope, the middle one will appear higher. Fig. 1 will help you to see why.

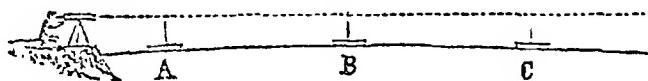


FIG. 1.—Diagram to illustrate the Bedford Level experiment.

(c) If we watch with a telescope a distant ship coming into view we see first of all the masts, then the funnel, and finally the hull. Similarly, if the ship is moving away it is the hull which disappears from view first. If the surface of the water were perfectly flat the steamer would look smaller in the distance, but one part would not go out of sight before another.

(d) A man standing on the seashore can only see a

short distance ; if he wants to see farther he must ascend a hill. Draw a diagram to show why this is so.

(c) The bright appearance of the moon is caused by



FIG. 2.—Diagram showing curvature of the surface of the earth.

the sun's light shining on her and being reflected to us on the earth. There are times when the earth gets between the sun and the moon, so that the earth casts a shadow on the moon. This is called an eclipse, and we notice that the shadow is always circular. Now only a spherical body always throws a circular shadow, and so we know that the earth must be spherical.

(f) The sun rises earlier for places to the east than it does for places to the west. If the earth were flat the sun

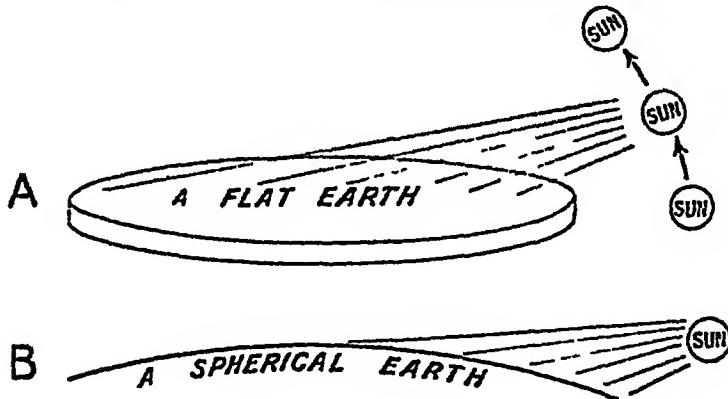


FIG. 3.—Sunrise if the earth were flat (A); sunrise as it actually is (B).

would be visible at all places on the earth's surface at the same time—directly it appeared above the horizon.

**Shape of the Earth.**—Although the earth is shaped like a ball it is not quite a true sphere. You will say at once, how can it be a sphere when there are high mountains and deep valleys which make the surface all rough and

irregular? But even the highest mountain and the deepest valley are very, very small when compared with the great size of the whole earth. On a school globe 1 foot in diameter, the highest mountain would be represented by a tiny grain of sand only  $\frac{1}{10}$ , part of an inch in diameter—that is, only a little thicker than the paper on which this is printed. Indeed, if you cut out a tiny piece of paper from this book and stuck it on the surface of the school globe, it would show the proper size of nearly the highest mountains. On the school globe there are marked the oceans, which are usually nearly  $2\frac{1}{2}$  miles deep. Yet if you pour a little water on the surface of the school globe and let it run off, the film of water left behind would represent the true depth of the oceans compared with the size of the earth. So you see the mountains and valleys do not prevent the earth from being very nearly a true sphere. But there is another reason why it is not a perfect ball. The earth is just a little flattened at the poles, and "bulges out" a little at the equator. You know that an orange is just a little flattened at each end, and the earth is just a little like that.

**Measuring the Earth.**—It would be possible, though very difficult and expensive, to measure the distance round the earth by actually going round it with some sort of measuring apparatus. There are, however, other ways of measuring the earth which are usually used. It is a remarkable thing that over 2000 years ago a learned Greek named Eratosthenes, who lived in Egypt, was able to say roughly how far it was round the earth, although at that time only a small part of the world was known to him—America and Australia were entirely unknown to the Greeks at that day. Let us see how Eratosthenes calculated the size of the earth. You know that every day the sun rises in the east of the sky, becomes higher and higher, passes right across the sky and sets in the west. At midday (12 o'clock) it is exactly half-way and is then, as we say, "crossing the meridian." That is to say, it is crossing an imaginary line drawn through the North and South points of the sky

and passing through the point (the zenith) immediately above our heads. Eratosthenes, living in Egypt, was able to observe the sun from a place called Assuan, and on one day found that at midday it was directly over his head, or in other words, coincided with his zenith. On the same day at the same time the sun was observed from another place in Egypt called Alexandria—a long way north of Assuan. It was found that the sun there was not directly

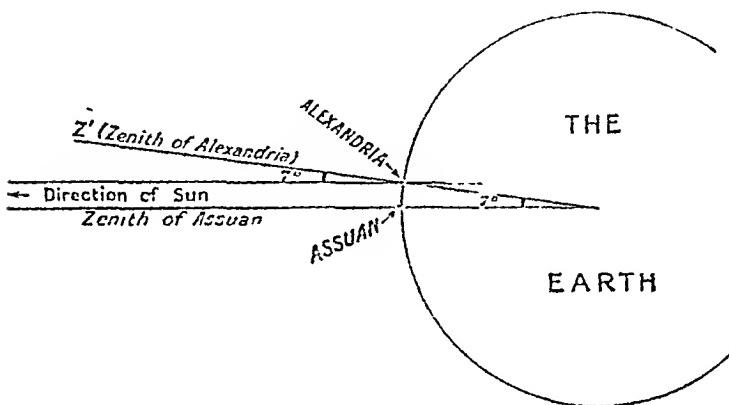


FIG. 4.—Eratosthenes' measurements.

overhead, but made an angle of  $7^{\circ}$  with the zenith. Let us see from the diagram how this happens.

You learn from your geometry the meaning of an angle. You know that a right angle is like this  $\angle$  and is divided into ninety little divisions called degrees. But you can have bigger angles than a right angle. Put four right angles together like this  $\angle\angle\angle\angle$  and you will see that four right angles make up a whole circle. In other words, any complete circle is  $4 \times 90^{\circ}$  or  $360^{\circ}$ . It is thus  $360^{\circ}$  round the earth. Eratosthenes found that the distance from Assuan to Alexandria was  $7^{\circ}$ , and he was able actually to measure on the ground the distance between these two towns. He did not measure it in miles as we do nowadays,

but he used the Greek measure called a stadium. Then he worked out a proportion sum like this:

If  $7^{\circ}$  between Assuan and Alexandria are represented by 5,000 stadia,  $1^{\circ}$  must be represented by  $\frac{5000}{7}$

$$\therefore 360^{\circ} \text{ must be represented by } \frac{360 \times 5000}{7} = \frac{1,800,000}{7}.$$

So that the whole circumference of the earth he found

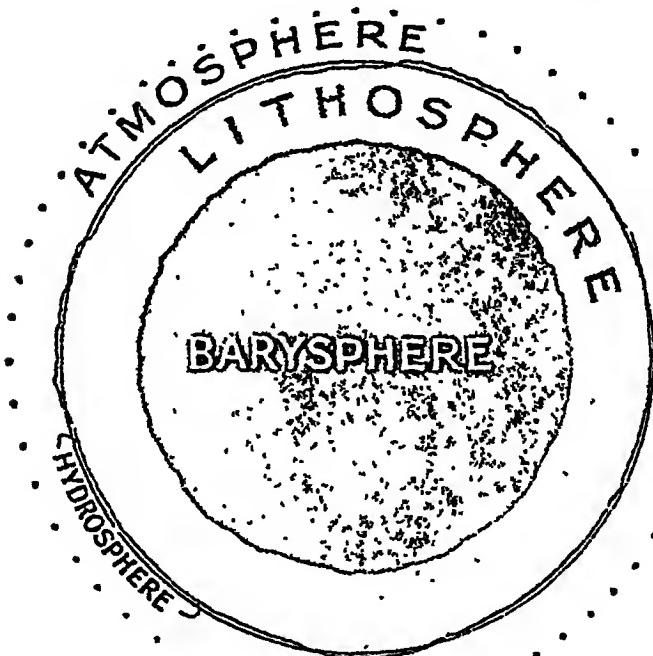


FIG. 5.—The constitution of the earth.

was 252,000 stadia. In English miles this is about 30,000. Eratosthenes was not quite right, for the distance has since been much more carefully measured and found to be about 25,000 miles.

**The Polar Flattening.**—We said above that the earth is not quite a true sphere because it is flattened at the poles. This is proved because we find  $1^{\circ}$  measured in

the *hydrosphere* or water sphere. Notice that this is very thin compared with the lithosphere and that the lithosphere projects through it so as to form the Continents. Then surrounding the whole is the air or *atmosphere*.

### THE SOLAR SYSTEM

In the old days men used to think that the earth was fixed and that all the stars moved round it. But the stars seemed to move about in all sorts of curious directions, and later some one discovered that it was the sun which was fixed and that the earth was moving round the sun. We now know that the sun is fixed and that moving round it are a number of large spheres called *planets*, of which our earth is one. The other planets appear to us as big "stars" in the sky. No doubt if we could live on one of the other planets such as Mars, the earth would appear to us as a big star. All the planets are moving round the sun, but they do not all move round at the same rate. The earth takes one year to move round the sun, causing the seasons. The earth is 93,000,000 (93 million) miles from the sun; some of the other planets such as Venus and Mercury are nearer the sun, the others (Mars, Jupiter, Saturn, Uranus, and Neptune) are farther away. It will help you to realise the huge distance from the earth to the sun if you imagine a very fast train going day and night at sixty miles an hour from the earth to the sun. It would take more than 175 years to do the journey.

Moving round the earth is a much smaller body—the moon. Another planet, Neptune, has a moon of its own, whilst others have more than one moon. Jupiter has four moons and Saturn eight. Compared with the sun, the moon is quite near the earth—only 240,000 miles away. Compared with the great size of the sun, the earth is very very small. If you represent the earth by the head of a pin stuck in the teacher's desk, the sun would be shown by a big ball at the other end of the classroom.

**The Stars.**—Quite different from the planets are the

stars which are very very much farther away, and do not move round the sun. They appear to us to be fixed ; the only motion which they appear to have is that due to the rotation of the earth.

The stars are very useful to us in geography, especially the star near the North Pole (that is, directly overhead at the earth's north pole) and which we call the Pole Star. You should be able to find the Pole Star. It is easy because a group of stars (or constellation) which form an



FIG. 6.—The constellation of the Great Bear and the Pole Star.

(From Longmans' "New Geographical Readers," Standard I.)

easily recognised shape have two stars in line which are always pointing towards the Pole Star. Study Fig. 6.

#### THE MOVEMENTS OF THE EARTH

The earth has two important movements : it turns round on its own axis once every day, causing day and night ; it moves round the sun once in every year, causing the differences between the seasons.

**The Rotation of the Earth on its Axis.**—Have you ever been in a boat crossing a river ? If you have, you will remember how the land appears to be moving away upstream while you are quite still. Really it is

you who are moving. the river is carrying you downstream while the land remains fixed. Similarly, sometimes when you are in a railway train starting from a station, the houses and buildings seem to be moving in the opposite direction. So it is that to us on the earth the sun appears every day to rise in the east, move up into the sky, and then sink down into the west. Really it is not the sun which moves, but we who are on the surface of the earth. The sun *appears* to move from east to west. really it is the earth moving round on its axis from west to east. The axis of the earth is an imaginary line joining the North and South Poles through the centre of the earth. Your school globe is made so that it revolves on this axis. Notice that if we live near the equator we move round a great distance in one day. but if we could live at the North or South Pole the only result is that we should be turned round once in a day.

**The Inclination of the Earth's Axis.**—Notice on your school globe that the axis of the earth is not placed

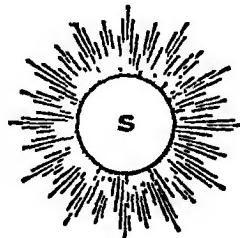
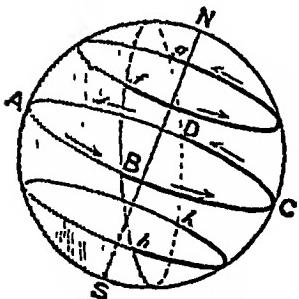


FIG. 7.—How day and night are caused.

*From Thornton's "Elementary Practical Physiography."*

in an upright position, but sloping to one side. This angle or slope, which we call the inclination of the earth's axis, is shown on the school globe for a very important reason. If you place the school globe at one end of a long table, and at the other end you put or hang a lamp exactly on a level with the centre of the earth, the lamp can represent

the sun. But remember the sun is really an enormous distance away, and is very, very much larger than the earth. The point to remember is the inclination of the earth's axis relative to the position of the sun. When the globe is arranged thus, turn it round on its axis and notice how day and night are caused. Try and find a place on the globe which will be in the dark (*i.e.* not receiving light from the lamp) the whole time, and other places where the light falls the whole time.

**The Movement of the Earth round the Sun.**—The earth's path round the sun is called its orbit. Its orbit

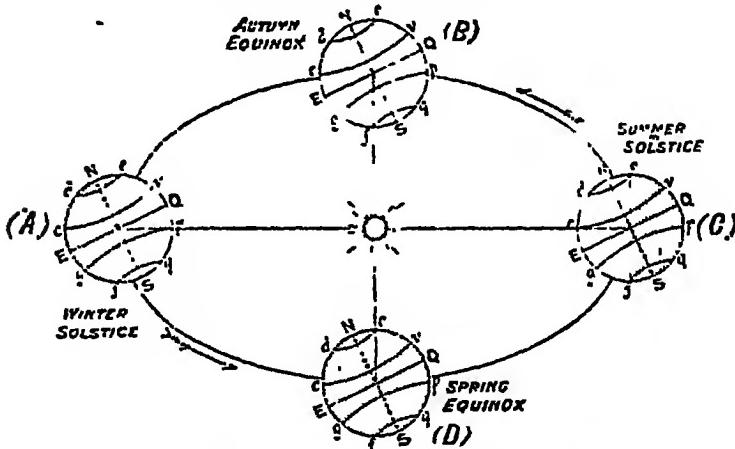


FIG. 8.—The movement of the earth round the sun.

(From Thornton's "Elementary Practical Physiography," Section II.)

is nearly, but not quite, a circle, so that at one part of the year the earth is slightly nearer the sun than at other times. Although the earth moves round the sun once every year, the earth's axis is always inclined in the same direction. This is very, very important for you to understand. You can best picture it by imagining the sun to be in the middle of your classroom. If you move the globe right round the room, that is, right round the sun in the centre, you will be imitating the earth's movement round the sun

every year. But when you move the globe, keep it so that the axis is always leaning over or inclined towards one particular end of the room. This is shown roughly in Fig. 8.

When the globe is in position A you will be able to find a spot which is directly facing the light, i.e. is directly under the sun. Rotate the earth and you will find there is a line along which all places come directly under the sun once a day, thus :

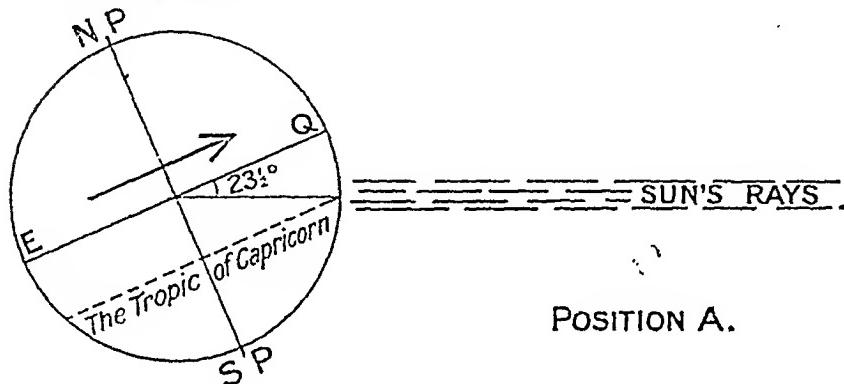


FIG. 9.—The Tropic of Capricorn.

We call this imaginary line the Tropic of Capricorn. You will find it marked by a dotted line on your globe.

When the earth is in position C you will be able to trace out another line in quite a different position, thus :

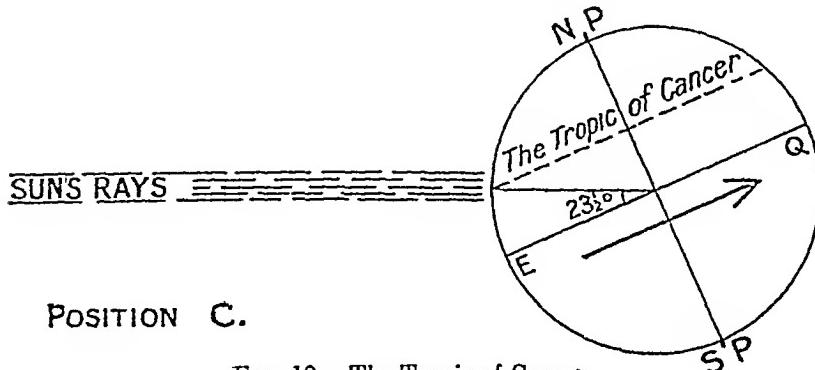


FIG. 10.—The Tropic of Cancer.

We call this the Tropic of Cancer.

When the globe is halfway between these two positions, we find that the line traced out in the same way is halfway between the two poles and is the line we call the equator.

The earth is in position A with the sun shining vertically over the Tropic of Capricorn on December 23, which we call the Winter Solstice. Notice that at this time a man standing at the North Pole would not see the sun at all. The sun is shining vertically over the Tropic of Cancer at the Summer Solstice, that is, on June 21. Midway between the two we have the equinoxes—March 21 and September 22—when the sun is shining vertically over the equator. These differences are the cause of the seasons.

#### LATITUDE AND LONGITUDE AND TIME

**Latitude.**—When we are on land we can fix our position on a map by observing prominent places or landmarks and finding them on the map. But if we were at sea there would be no such landmarks, and we should not know if we were near land or a long way from it. For this and for many other reasons it is necessary to imagine a series or network of fixed lines over the surface of the earth. There are certain points on the earth's surface which are easily defined. Firstly, there are the North and South Poles, and these form two important points. Running round the earth halfway between the two poles we imagine a line which we call the *Equator*. If you go from the Equator to the North Pole or the South Pole you will see that you go through a quarter of the whole circle or circumference; that is, you go through one right angle or  $90^\circ$ , and so from the equator to the poles we mark off ninety divisions, each forming one degree. We can draw lines round the earth parallel to the equator through each of these divisions. These lines are called *parallels of latitude*. Notice that each parallel of latitude forms a circle with the pole as centre, but the circles get smaller

as we go from the equator to the poles. We start numbering the parallels of latitude at the equator, which is called  $0^{\circ}$ , till we reach the poles, which are  $90^{\circ}$ . Those north of the equator form north latitude, those south south latitude. Each degree of latitude can further be divided into sixty divisions called minutes. Each minute can be divided into sixty seconds. The latitude of a place can be defined as its distance north or south of the equator, measured as an angle.

**Longitude.**—We have now a means of showing distance from the equator or the poles, but we must have some means of measuring round the earth. If we go round, following the equator or any of the parallels of latitude, we shall pass through a complete circle, or  $360^{\circ}$ . So we can mark off along the equator 360 equal divisions or degrees. Then we can draw lines from the North Pole to the South Pole passing through each of these divisions. These are lines or meridians of longitude. Then comes the trouble, how shall we number the meridians of longitude? At the town of Greenwich near London there is a famous observatory where the stars and objects of the sky have long been studied, so it is usual to start with the line of longitude which passes through Greenwich and call it  $0^{\circ}$ . Then we number the degrees east and west of Greenwich till we reach halfway round the globe, and line  $180^{\circ}$  west of Greenwich is the same as  $180^{\circ}$  east of Greenwich. Just as we divided each degree of latitude into sixty minutes so we can divide degrees of longitude into minutes. The longitude of a place can be defined as its distance east or west of the meridian of Greenwich, measured as an angle.

Notice very carefully that degrees of latitude are the same length over the whole world, but degrees of longitude get shorter and shorter as we travel from the equator to the poles.

**Some Important Parallels of Latitude.**—There are two important angles which are constantly reappearing in geography. They are  $23\frac{1}{2}^{\circ}$  and  $66\frac{1}{2}^{\circ}$ . You have already learnt that the earth's axis is inclined, as we say, to the

plane of its orbit. The angle of inclination is  $66\frac{1}{2}^{\circ}$ . If you subtract  $66\frac{1}{2}^{\circ}$  from  $90^{\circ}$  you get  $23\frac{1}{2}^{\circ}$ .

If you study Fig. 11 carefully you will see that the Tropic of Cancer, about which you have already learned, is the same as latitude  $23\frac{1}{2}^{\circ}$  North, and the Tropic of

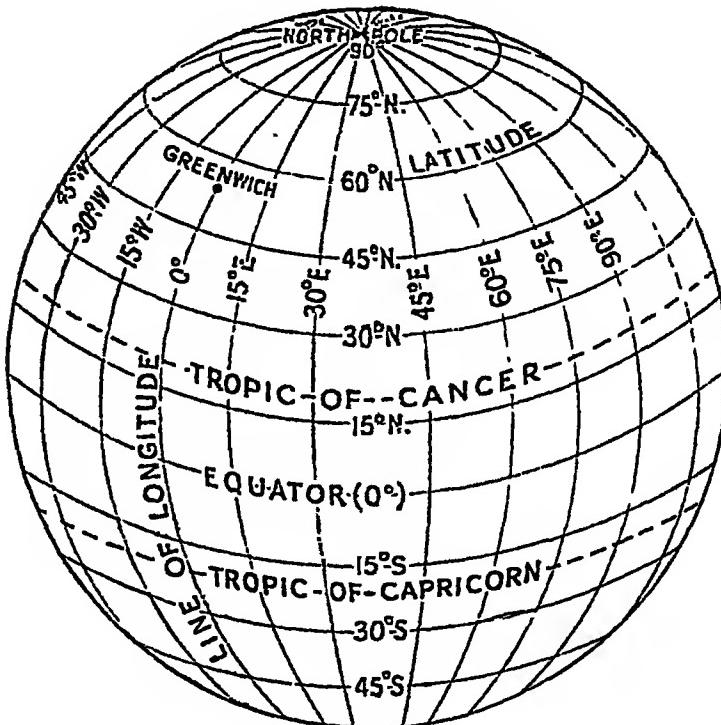


FIG. 11.—Diagram of latitude and longitude.

Capricorn the same as latitude  $23\frac{1}{2}^{\circ}$  South. The latitude  $66\frac{1}{2}^{\circ}$  North we call the Arctic Circle, latitude  $66\frac{1}{2}^{\circ}$  South is the Antarctic Circle.

You learnt above that at some seasons of the year a man standing at the poles would not see the sun at all during the day, at other seasons of the year the sun is shining all day and all night too. Within the Arctic and

Antarctic Circles there is at least one day in the year during which the sun does not set and at least one day on which it never rises. As we get nearer and nearer the poles the number of such days increases until at the poles themselves there is darkness for half the year and sunlight for the other half.

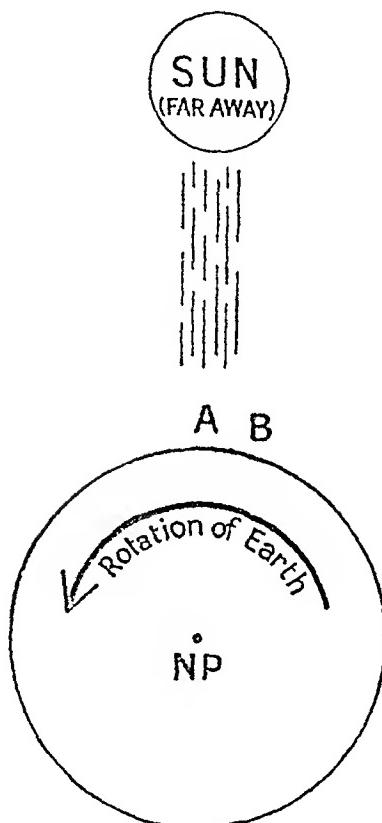
**The Zones.**—We shall learn later that the heat of the sun is stronger near the equator than at the poles, and so the hot parts of the globe are near the equator and the

coldest parts round the poles. We can divide the earth into five zones: inside the Arctic and Antarctic Circles we have the Cold or Frigid Zones (north and south); on either side of the equator but between the two tropics we have the Hot or Torrid Zone; between the Tropic of Cancer and the Arctic Circle is the North Temperate Zone; between the Tropic of Capricorn and the Antarctic Circle is the South Temperate Zone. Note that outside the tropics the sun is never shining vertically overhead.

**Local Time.**—When the sun is crossing the meridian of any place it is twelve o'clock or midday at that place, according to "local time." In other words, on any day when the sun reaches its highest point in the sky it is noon of local time.

For finding accurately when the sun is crossing the meridian we have to use an instrument called a sextant.

FIG. 12.—Diagram to illustrate the meaning of local time.



Now look at Fig. 12. It shows two places, A and B, quite close together on the earth's crust. As the earth revolves on its axis in the direction shown by the arrow it is obvious that A will come directly under the sun before B, so that it will be noon at A before it is at B. It is only if two places are directly north or south of one another—that is, if they are on the same meridian of longitude—that they will come under the sun at the same time, and so have the same local time. It is very important that you should quite understand this. Thus Rangoon and Mandalay have nearly the same local time because they are nearly on the same line of longitude, but the local times of Rangoon, Calcutta, and Bombay are very different.

**Standard Time.**—It would be very difficult if every town and village in a country had its own time, and whenever we moved from one village to another we should have to alter all our watches and clocks. So it is usual to choose for each country or each part of a large country a standard time for use over the whole country. It is as a rule the local time of the most important town in the country, or the local time of some place near the centre of the country. Some countries have more than one standard time. Thus in India all the railways use "Railway Standard Time," but in Calcutta for all ordinary purposes Calcutta Standard Time is used. You will find the big clock in the tower of Howrah Station is nearly twenty-five minutes behind the other clocks in Calcutta.

**Greenwich Mean Time.**—There is one standard time which is very important, and that is the standard time of England, usually called Greenwich Mean Time. It is the local time of Greenwich Observatory, which, as you know, is on longitude  $0^\circ$ .

**How Longitude is determined.**—The earth takes twenty-four hours to revolve once on its axis, and so in that time passes through  $360^\circ$ . Thus in one hour the earth moves  $15^\circ$ , or in four minutes through  $1^\circ$ . Now look again at Fig. 12. Suppose the places A and B are  $1^\circ$  apart. A will be directly under the sun (*i.e.* it will be midday local

time) four minutes before B. There is thus four minutes' difference in local times for each degree of longitude. We use this fact for determining longitude. All longitudes are

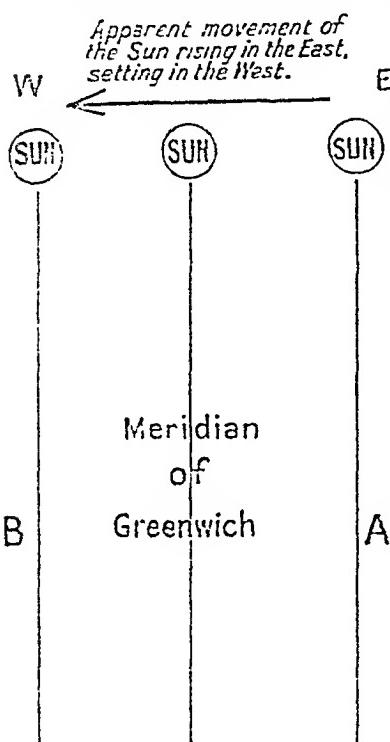


FIG. 13.

measured from the meridian of Greenwich, and so we use Greenwich Time as a standard of comparison. We have very accurate clocks, called chronometers, showing Greenwich time, and we compare them with local time. For each degree east or west of Greenwich there will be four minutes' difference, so if the difference is eight hours, the longitude will be  $\frac{8 \times 60}{4} = \frac{480}{4} = 120^\circ$ . We now have to decide whether the place is east or west of Greenwich. Look at Fig. 13. If A is east of Greenwich it will be directly under the sun long before Greenwich is, and it will be noon at A when it is still early

at Greenwich. So if local time is *in front* of Greenwich time, the place is *east*. Here is a rhyme which will help you to remember :

Go to the east Greenwich time is least,  
Go to the west Greenwich time is best.

**The International Date Line.**—Study Fig. 14 very carefully. Notice that when the sun is directly over the meridian of  $45^\circ$  E. (*i.e.* it is twelve o'clock noon at  $45^\circ$  E.), let us say on a Monday, it will be 9 a.m. at Greenwich, and at a place  $179^\circ$  west of Greenwich it will be four minutes past nine on Sunday evening. Work this out very

carefully for yourself and see that it is correct. If we go eastwards from  $45^{\circ}$  E. instead of westwards, we find that at a place  $90^{\circ}$  E. it is 3 p.m. on Monday. At a place  $179^{\circ}$  east of Greenwich it will be four minutes to nine on Monday evening. When we reach  $180^{\circ}$  we find that it is 9 p.m. on Sunday if we have calculated westwards from Greenwich, but 9 p.m. on Monday if we have calculated eastwards from Greenwich. So we have to draw a line

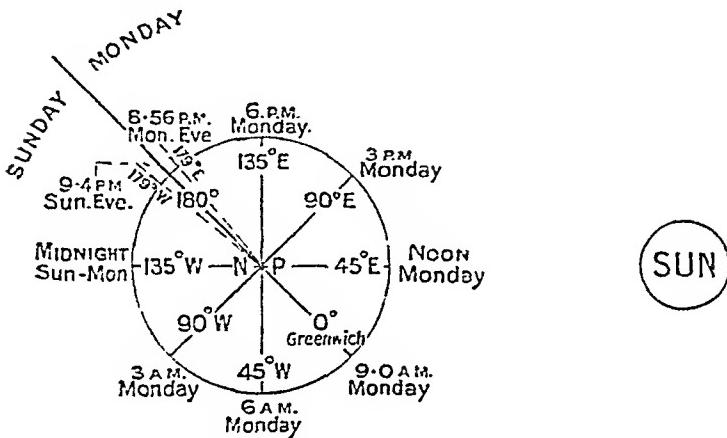


FIG. 14.—Diagram illustrating the International Date Line.

somewhere near the meridian of  $180^{\circ}$ , and agree to say that on one side it is Sunday, and on the other side Monday. Look at Fig. 15 to see what happens when a ship crosses this "International Date Line."

**How Latitude is determined.**—It is much more difficult to find latitude than it is to find longitude. Sailors at sea find the latitude of their ship by observing the sun at midday; we can also find it by observing the Pole Star or some particular star.

Let us see how to do it by using the Pole Star. Remember that latitude is the angular distance of a place from the equator, and remember that the zenith of a place is the point of the sky immediately above a place. So the latitude is also the angular distance between its

zenith and the zenith of a place on the equator. Similarly, the Pole Star is the zenith of the North Pole. At the equator the observer would see the pole star on the horizon ; going northwards  $1^{\circ}$  or 69 miles, it would be  $1^{\circ}$  above the horizon, and so for every degree of latitude passed over

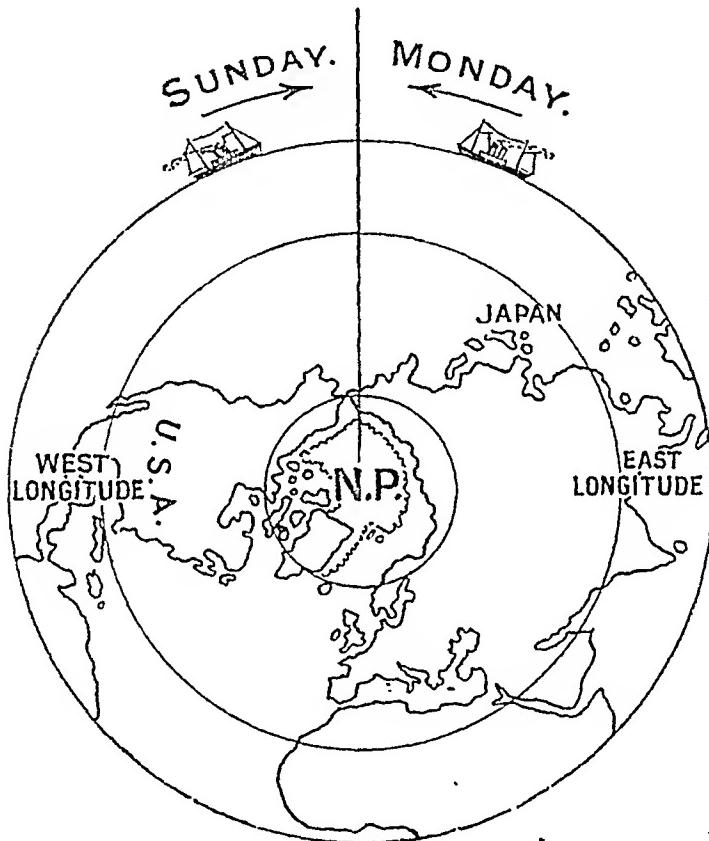


FIG. 15.—What happens when the date line is crossed.

the star rises  $1^{\circ}$  in altitude, until at the pole it would be found to be overhead.

If we use the sun at midday or other stars we measure the angle of the sun or star above the horizon with our sextant, and then we refer to a big book called the "Nautical Almanac," in which there are tables showing how to find

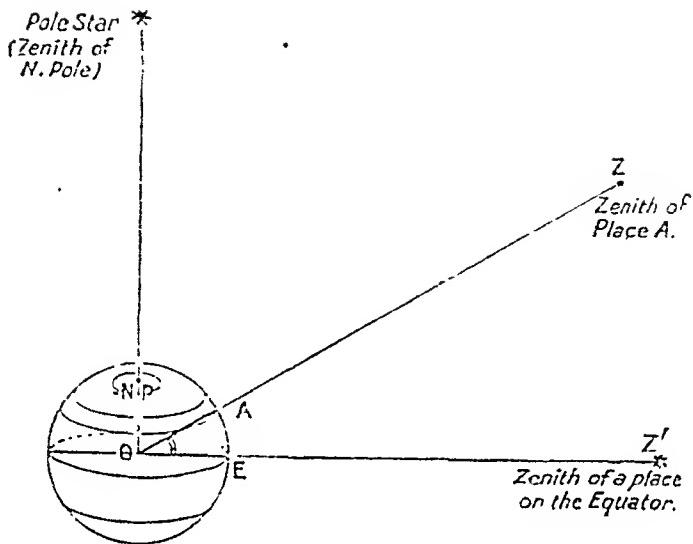


FIG. 16.—The meaning of latitude.

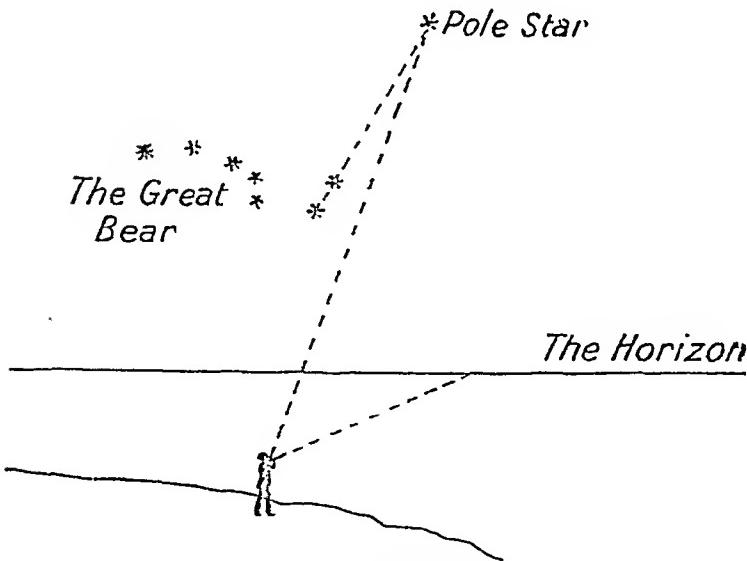


FIG. 17.—Determining latitude:

the latitude from this observation. This is the way in which all ships find their latitude, and so make sure that they are keeping to their proper courses and not being blown by wind or carried by current into places where there is danger.

**True North and Magnetic North.**—The Pole Star is very nearly at the zenith of the North Pole, and so, in the Northern Hemisphere, if we walk in the direction of the Pole Star we are walking true north. But it is not always possible to observe the Pole Star. So we use a little instrument called a compass. One end of the compass needle always points towards a point on the earth's crust which is near the North Pole. This point is called the "Magnetic North Pole." In this country the magnetic North Pole is almost in the same direction as the true North Pole, and so in India our compasses point almost true north. In other countries, such as England, there is often a great difference in direction between true north and magnetic north. It is a curious fact that the magnetic North Pole does not seem to be fixed, but changes slightly from year to year.

#### MAP PROJECTIONS

The earth is a round ball, but the maps in our Atlases are flat. Unfortunately we cannot show a curved surface properly on a flat piece of paper. If you take the skin of an orange you know that you cannot spread it out flat without splitting it all round the edges. Similarly, if you take a flat piece of paper and try to spread it round a globe you cannot do so without crumpling it very much at the edges. If we want a map of a small area the earth is so large that the curvature of the earth makes very little difference. But if we want to make a map of a large area, such as a continent, the curvature of the earth makes a great deal of difference.

Look at the school globe and turn it so that India is towards you, and then stand some distance away. It will

appear rather like the photograph of a globe shown in Fig. 18. Notice that only countries near the centre—India and Arabia—appear in their true shape and size. Notice that Australia and Europe near the edge of the photograph appear much smaller than they really are, and curiously drawn out in one direction. You know, too, that EQU on Fig. 18 is half the earth's circumference, and is the same length as the curve ESU'. You see that it does

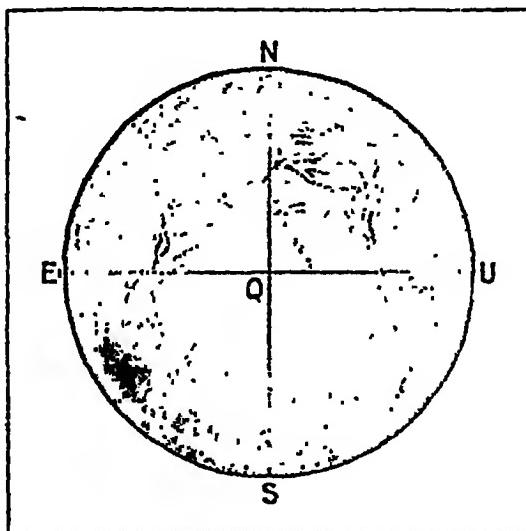


FIG. 18.—The orthographic projection.

(From Longman's "Geographical Series for India," Book II.)

not appear so on the photograph. In order to make such inaccuracies as small as possible there are various means adopted to reduce the surface of the round earth to a flat surface. The various arrangements of the network of meridians and parallels on a flat surface give us the different "projections."

**Common Map Projections.**—Different map projections may have different objects in view. Some aim at showing direction always correctly. This is done in

Mercator's projection, which as a result is used in maps for sailors, since directions such as North-West, East, North, and South are represented by straight lines. Others aim at showing areas correctly. Thus, Mercator's projection makes Greenland nearly as large as Africa, but it is really only about  $\frac{1}{25}$  of the size. Mollweide's Projection shows areas correctly, but the shapes of countries

are very bad. Other projections aim at showing shapes correctly. For most purposes the best maps are those which take all these objects into consideration. Projections commonly used in atlases fall into four groups—cylindrical projections, conical projections, horizontal or hemispherical projections, and conventional nets.

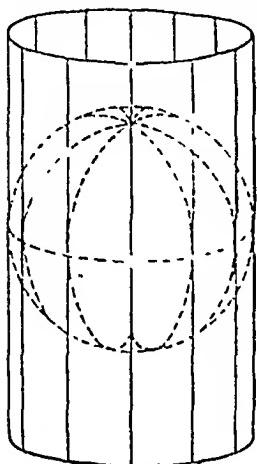


FIG. 19.

(From Longmans' "Geographical Series," Book V.)

paper. When the paper is unrolled there is a map of nearly the whole world, but it is impossible to show the poles on such a map. The principal cylindrical projections are *Mercator's* (Figs. 37 and 38: notice the enormous exaggeration of Greenland) and *Gall's* (Figs. 78, 80, etc.: notice that countries to the north and south appear "squashed," but that their size is not so badly exaggerated as in Mercator's). The "rhumb-line" or line of constant bearing being a straight line on Mercator's projection, a navigator would be able to draw a straight line between two ports on the map, and take his ship from one to the other by maintaining a constant direction. If you study a globe and take two ports such as Yokohama and Vancouver, you will find, however, that this is not the shortest distance between the two. Why?

**Cylindrical Projections.**—Here we imagine the globe surrounded by a cylinder of paper (Fig. 19), or cut by a cylinder of paper (Fig. 20), and the points on the surface of the globe are "developed" on the

**Conical Projections.**—Here we imagine the globe surrounded by a cone of paper (Fig. 22), the apex of the cone usually being placed above the pole. The line along which the cone touches the globe is the "standard parallel." Or the cone may be supposed to cut the globe along two standard parallels (*secant conic projection*). In these projections straight lines radiating from the apex of the cone represent the lines of longitude; concentric circles the lines of latitude. These projections can only be used for part of the globe, usually for part of one hemisphere only.

**Horizontal Projections.**—In these the surface of each *hemisphere* is developed on a flat piece of paper touching or cutting the globe. The orthographic projection (Fig. 18) is the map

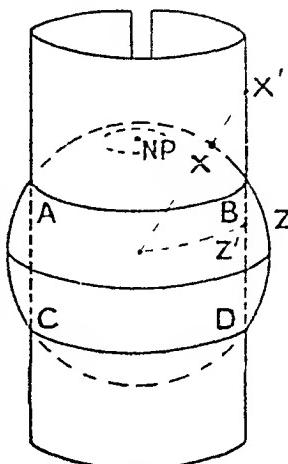
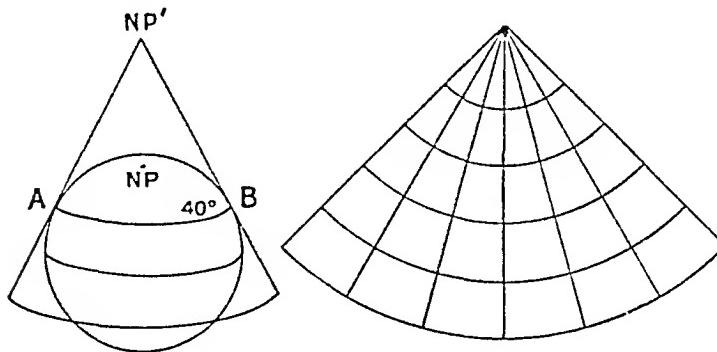


FIG. 20.



FIGS. 21 and 22.—Conical projection.

we get as if we were looking at the earth from a very great distance away.

**Conventional Nets.**—Some useful projections cannot

be obtained by a mathematical development of the earth's surface. Amongst these are Mollweide's Projection (Figs. 90, 91) and Bonne's Projection. The latter is like a conical projection to look at, except that the lines of longitude are curved.

### MAP MAKING

Before the globe can be used for making projections it is evident that the surface features of the earth must be

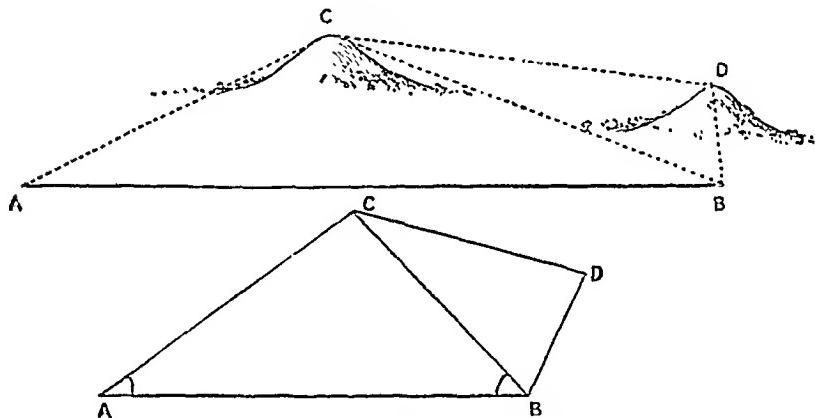
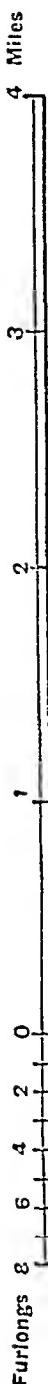


FIG. 23.—Diagram to illustrate triangulation.

very accurately shown on it. Moreover, we require very careful maps of small areas of country. The work of making detailed maps by actual measurement of the ground is called surveying. So important is this work that nearly all Governments have a special department for the making of maps. The Survey of India has its offices at Calcutta, and is a very important branch of the Government. It not only makes a full series of detailed maps, but special maps for other departments, such as the Forest Department, Land Records and Revenue Depart-

ments. In surveying a country it is usual to fix very accurately the latitude and longitude of one spot as a starting-point. In the survey of India, Madras Observatory is the point which was used. Then a *base line* must be very very carefully measured—that is, a straight line on flat ground. A convenient length for a base line is 1 or 2 miles. Then by means of an instrument called a theodolite we observe, from each end of the base line, some prominent point such as the top of a hill. Suppose AB in Fig. 23 is our base line and we observe the hilltop at C, by means of the theodolite we measure the angles ABC and ACB. We can then fix the point C on our map. From B and C we observe another point D in the same way, and so on until we have covered the whole country with a network of triangles, the corner of each triangle being some prominent point, such as a hilltop. This method of measurement is called Triangulation. The details between these fixed points are filled in by “plane-table” survey. Triangulation has to be carried out very carefully and with most accurate instruments. If this is done the errors only amount to a few inches in many miles.

Scales.—In making maps in this way it is most important to decide the scale. A certain number of inches on the map or paper will represent a certain number of miles on the ground. This ratio of distance on the paper to distance on the ground is called the scale. The scale may be stated or expressed in many different ways. For example, a very common scale for detailed maps is for one mile on the ground to be represented by one inch on the map. We can call this a scale of 1 inch to 1 mile. But there are 63,360 inches in one mile, so that on our map 1 inch represents 63,360 inches on the ground. We can express this as a fraction thus  $\frac{1}{63,360}$  (called the Representative Fraction). Any distance on the map will thus be  $1/63,360$ th part of the true distance. In your Atlas you will probably find maps on the scale of  $1/5,000,000$ , that is, one inch on the map represents 5,000,000 inches on the



ground, or about 80 miles. When one inch represents a very big distance we call it a small-scale map; when one inch only represents a short distance (as 1 inch to 1 mile) we call it a large-scale map. Most of the maps in your Atlas are small-scale maps. You have learnt above that maps of large areas or the whole world are contorted because we cannot represent a curved surface on a flat piece of paper. For that reason we cannot always have a definite scale for a small-scale map, because one inch on the map in one place will represent a greater distance on some parts of the map than on others. You will not find any scale in your Atlas for a map on Mercator's projection for this reason.

In one corner of a map we usually find the "scale" stated, and we also find a line marked off into divisions which represent so many miles. Look at Figs. 150, 161, 170, etc., for this.

**Representation of Height.**—A map is a flat piece of paper, and so we must have some means of showing hills and valleys. There are several ways of doing this.

(a) *Contours*.—On large-scale maps a very common way of showing height is by means of contours. A contour is an imaginary line passing through all points at the same height above sea-level. You will understand this more easily if you think what would happen if the sea suddenly rose. If the sea rose everywhere 100 feet above its present level, all places less than 100 feet above the present level of the sea would be covered by water. We should then have a new coastline, so that only those areas more than 100 feet above the present sea-level would still remain land. This new coastline would be the same as the present 100-foot contour line. Similarly, we

can imagine the sea rising 200, 300, 400, 500, 1000, 2000 feet, giving us successive coastlines which would correspond to the contour lines.

(b) *Coloured layers*.—A better method than contour, and one which can be shown on maps of all scales, is to colour differently the parts of a country between certain heights. Usually the low lands are coloured green and the higher parts various shades of brown, the darker the brown the higher the land. In this book the maps of the continents are simply coloured on this scheme in three colours only.

(c) *Hachures*.—On large-scale maps heights may be distinguished by degrees of shading as in Fig. 25. Where the slope is gentle the shading is light; where it is steep the shading is heavy. The lines of shading are called hachures. On small-scale maps a variety of hachuring is sometimes used to show mountain ranges. The mountains are shown as "caterpillars." This method is not good, because we cannot distinguish between long narrow ranges and large areas of high ground, and the caterpillars hide the names of the places.

(d) *Photo-relief*.—Another method is to show height or relief by photographing a model. This is only useful to give us a general idea of the main physical features of a country or continent.

**Determination of Height.**—This is usually done in the course of ordinary surveying by means of the theodolite.

**Determination of Depth of the Ocean.**—This is done by means of sounding: a weight on the end of a fine wire is let down from a ship until it touches the bottom, and the length of the wire is then read off. Depth is expressed in "fathoms" (1 fathom = 6 feet), and we can draw contour lines through all spots having the same depth.



FIG. 25.—Hachures.

(Press Information, "Geographical Series for India," Book II.)

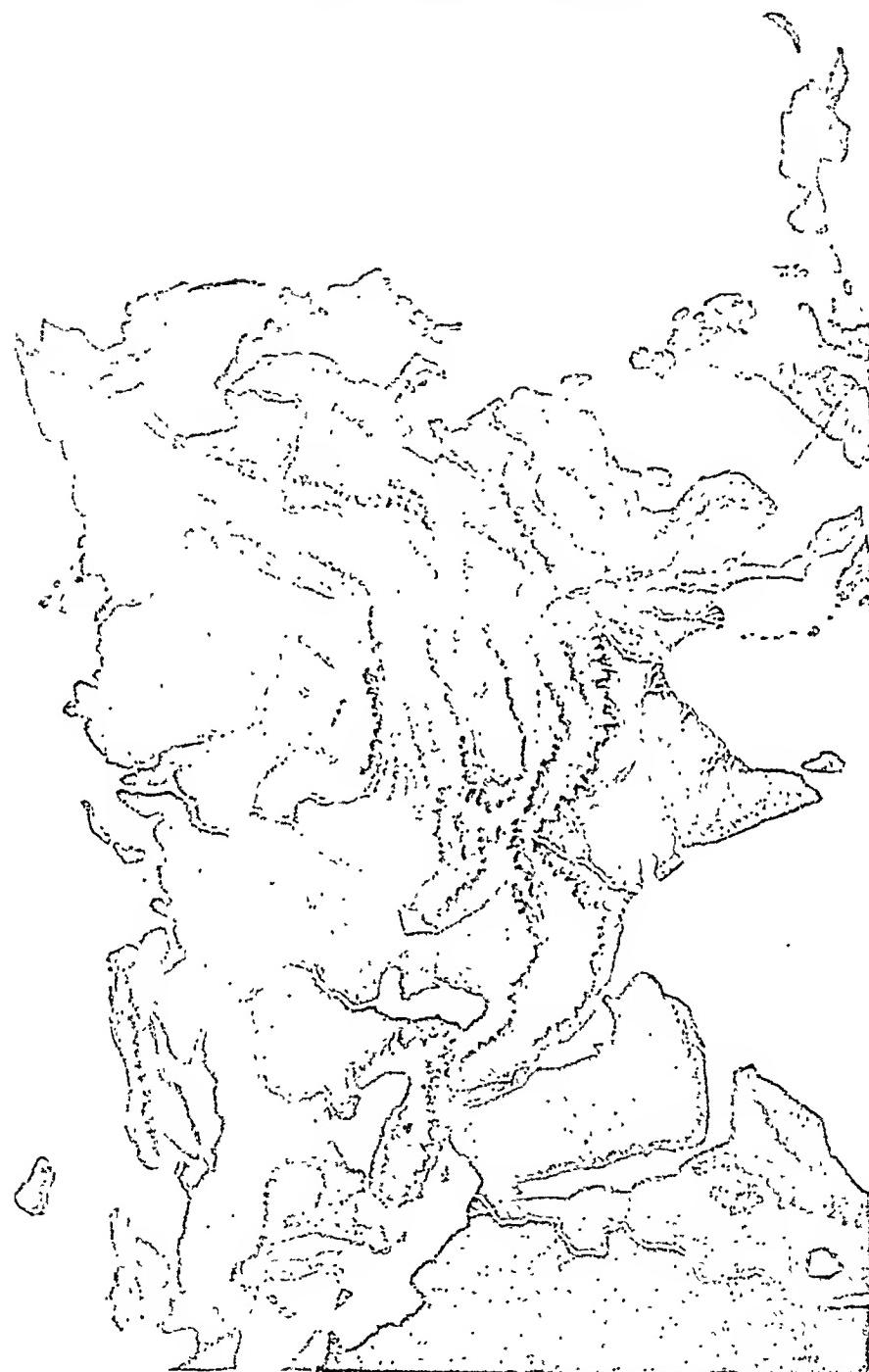


FIG. 26.—Photo-Relief map of Asia.

### MAP READING

Study carefully the piece of 1 inch to the mile Survey map of India (Fig. 28), and the signs used on these maps (Fig. 29). Notice the different signs used to show roads, rivers, railways, contours, etc. The signs used vary very much in different countries. Some of the best maps in the world are those for Switzerland and the British Isles.

### SECTIONS

Fig. 27 represents an island with contours shown.

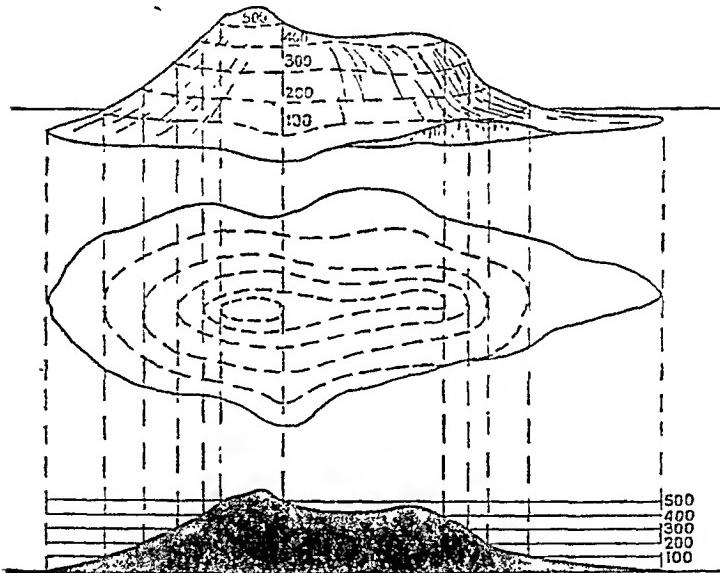
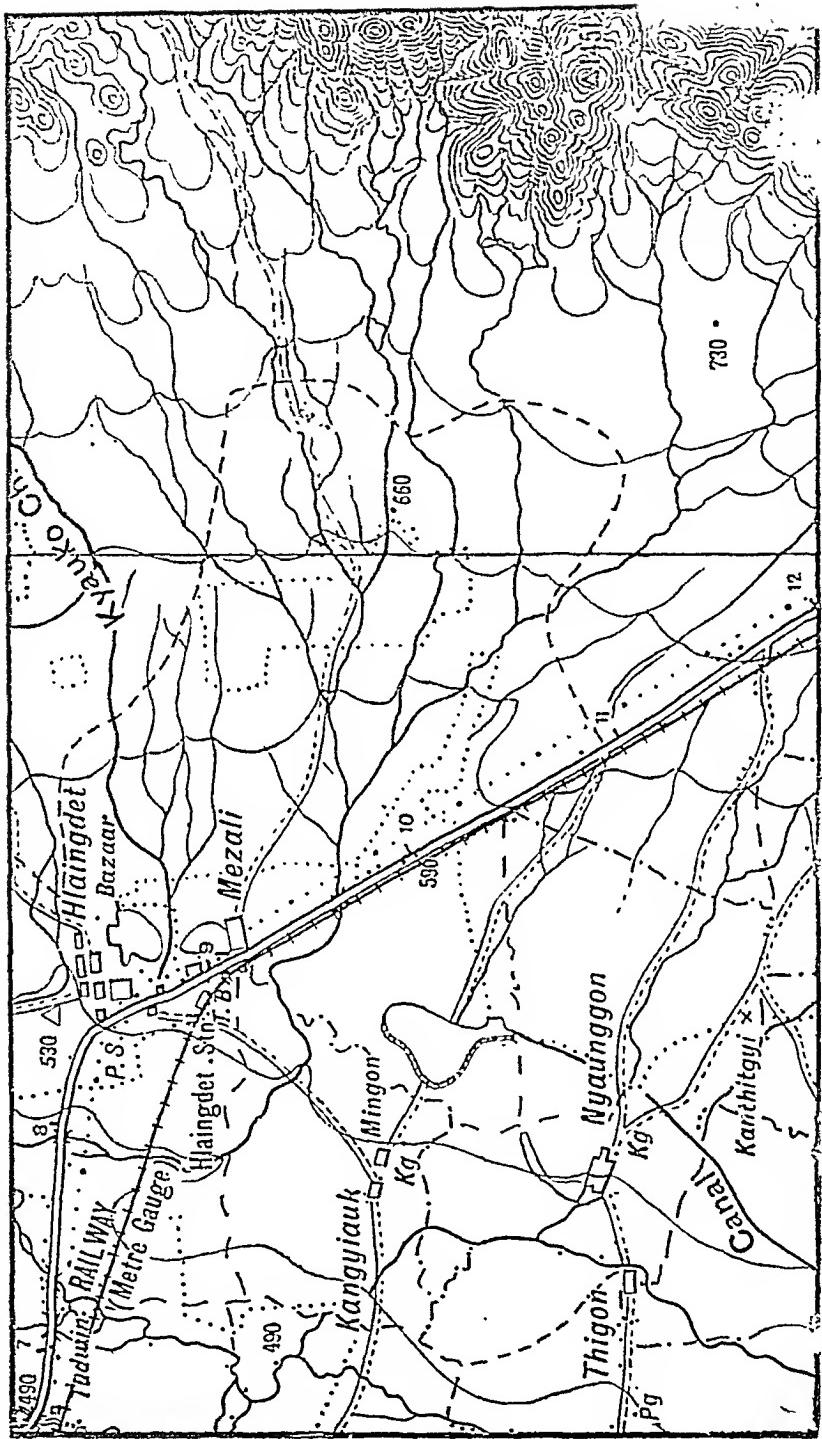


FIG. 27.—A contoured map and section.

Below it is a section. Notice very carefully how it is constructed. In the same way that we choose a scale for distances on a map, so we must now choose a "vertical scale" for showing heights. In some cases we can use the same scale, but usually the vertical scale is greater.



(you remember that the Greek word *haros* means weight, so a barometer is really a measurer of heaviness).

If a glass tube about 3 feet in length be closed at one end, filled with the very heavy liquid mercury, and inverted with its open end in a cup containing the same substance,

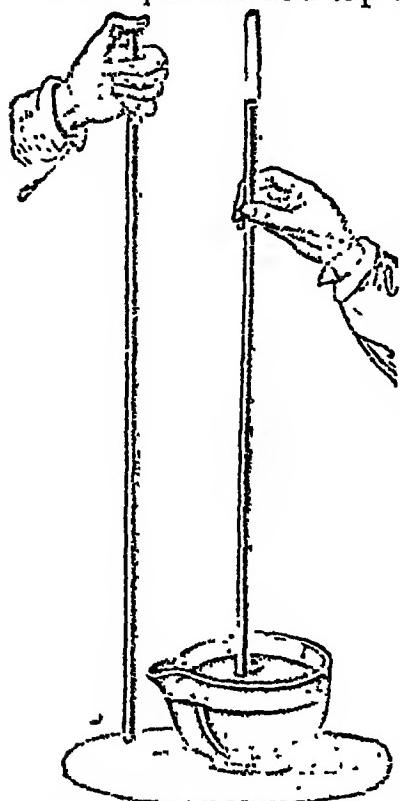


FIG. 31.—Diagram of a barometer.

the mercury will fall in the tube until its level is about 30 inches above the level of the mercury in the cup. This is because the weight of a column of the very heavy mercury is equal to and balances the weight of the column of air 20 miles high. Now as the pressure of the air varies, so the height of the column of mercury varies. When we talk about a pressure of 30 inches or of 29.5 inches we mean that the pressure of the air will balance a column of mercury of that height. On a mountain 15,000 feet high—like Mont Blanc in Europe—the pressure is only about 15 inches.

The air pressure at sea-level is affected by several factors.

(1) *Temperature*.—Heat causes air to expand and become less dense, and so when the temperature is high the pressure is low.

(2) *Water vapour*.—Air with much water vapour is lighter than air alone. So in India the pressure is less in the rainy season when the air is damp.

When we look at the world as a whole we find there are certain marked "high-pressure belts" and certain marked "low-pressure belts," arranged as follows:—

- (1) Low-pressure belt round the equator.
  - (2) High-pressure belts just outside the tropics in both north and south hemispheres.
  - (3) Low-pressure regions over the cold regions round the latitudes of the Arctic and Antarctic Circles.
- (1) *The Equatorial Low-pressure Belt* is caused by the great heat making the air hot and therefore light, by the

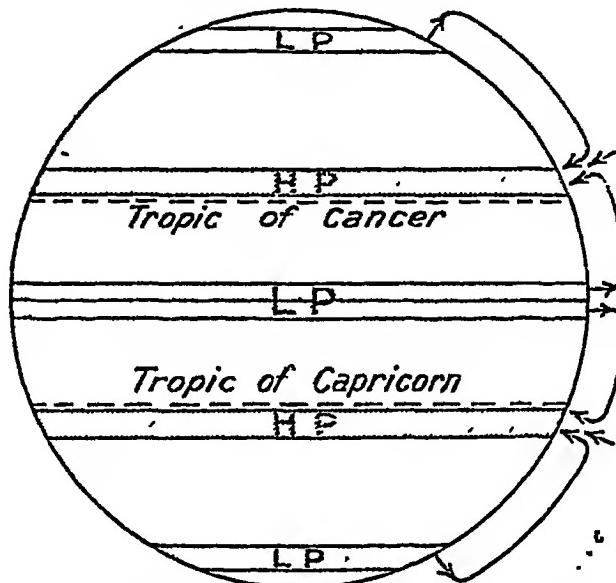


FIG. 32.—Diagram showing the pressure belts of the globe and the currents of air in the upper atmosphere.

large quantity of water vapour: the air is always damp in this belt.

(2) *The Polar Low-pressure areas* are caused largely by the rotation of the earth. The envelope of air is thin here, for the rotation swings the bulk of the air towards the equator. At the poles themselves there are high-pressure centres, probably caused by extreme cold.

(3) *The High-pressure Belts*.—It is reasonable to expect

a belt of high pressure near the tropics, between the two belts of low pressure ; and this is exactly what we do find.

Notice the movement of the air in the upper part of the atmosphere. The heated air of the equator rises and flows away polewards. It becomes cooled and commences to sink towards the earth along the high-pressure belts.

#### TEMPERATURE OF THE ATMOSPHERE

The earth obtains nearly all its heat from the sun. The sun's rays do not heat the whole surface of the earth equally. A place which is directly under the sun gets more heat than a place which is sloping away from the sun. At the equator, then, where the sun is overhead for a greater part of the year, a bundle of sun's rays are only spread over a small area ; near the poles the sun is never overhead—the same number of rays is spread over a much larger area. The sun's rays, too, lose some of their heat in passing through the atmosphere, and notice from Fig. 33 that

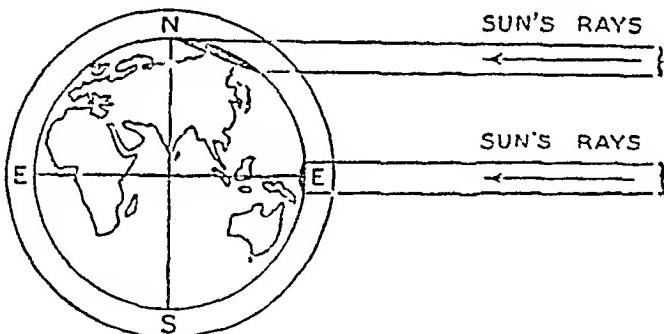


FIG. 33.

the rays have to pass through a greater and greater thickness of air as one goes from the equator to the poles.

In the " Hot Weather " you know that you feel very hot in school, but in the " Cold Weather " you are not so uncomfortable, for the weather is cooler. We can say the temperature of a body or thing is high or it is very hot, or we can say the temperature of the thing is low and it

is cold. But we must have a more exact way of measuring temperature, and so we use an instrument called a "thermometer." Most things, when they are heated, expand or grow larger. A thermometer consists of a narrow tube with a bulb at the bottom. The bulb and part of the tube are filled with mercury or alcohol. The mercury or alcohol is warmed or cooled according to whether the surrounding air is warm or cold, and therefore rises or falls in the tube. So we can mark on the stem of the thermometer little divisions. There are two very important marks on the thermometer "scale": one is the temperature of melting ice, the other is the temperature of boiling water. You know that you can measure weight either by Indian seers, Burmese viss, or English pounds. In the same way there are different scales by which temperature is measured. The two most important are the Fahrenheit and Centigrade scales. In the Fahrenheit scale the temperature of melting ice is called 32 degrees (written  $32^{\circ}$  F.), and of boiling water 212 degrees ( $212^{\circ}$  F.), and between the two we have 180 little divisions (degrees Fahrenheit). In the Centigrade scale the temperature of melting ice is called 0 degrees ( $0^{\circ}$  C.) and boiling water 100 degrees ( $100^{\circ}$  C.), and between the two we have 100 degrees Centigrade. In this book we shall use Fahrenheit degrees. Besides the simple one there are several different kinds of thermometers. The most important are the "maximum thermometer" and the "minimum thermometer." Inside the tube of the maximum thermometer there is a little piece of metal which is pushed up and up as the temperature rises, but which stays at the highest point when the temperature drops. This thermometer thus shows the highest tem-

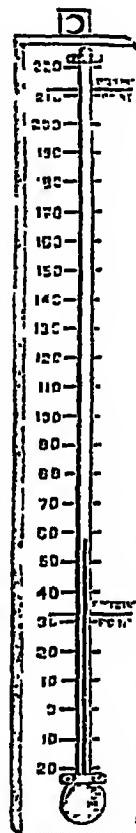


FIG. 34.—  
Picture of a  
thermometer.

perature reached during the day. In the minimum thermometer the little metal indicator is arranged to show the lowest temperature reached during the day. You know from your arithmetic that halfway between the maximum and minimum will be the mean temperature.

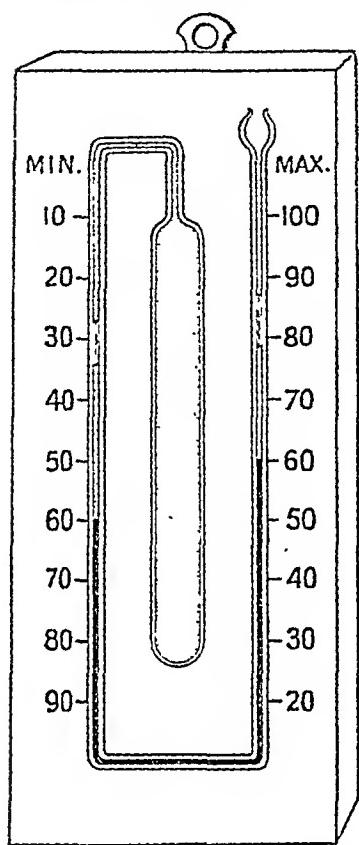


FIG. 35.—Picture of a combined maximum and minimum thermometer.

Temperature records must be very carefully kept for each day; each day has its maximum, minimum, and mean temperatures. The difference between maximum and minimum is the range of temperature. In some places the nights are very cold and the days very hot. These places are said to have a great daily range of temperature. When the temperature has been recorded for every day of the month we can find the monthly average temperature—that is, the average for the mean temperature of each day of the month. Some years are hotter than others, so it is much better if the observations are spread over a number of years.

Here is an example:

Place A.	Year.	Average January temperature.
	1915	46·2°
	1916	44·8°
	1917	45·1°
	1918	45·7°
	1919	46·8°
	1920	46·4°
	1921	44·8°
		7) 319·8
		45·6° average

Remember, then, that the most important temperatures in geography are the monthly averages. In most parts of the world the greatest differences are found between the months of January and July, and you will find that most of the temperature maps in this book are for January and July. In many parts of India, however, the hottest month is not July because the rains help to make that month cool, but April or May. If we take the temperature of the hottest month and the temperature of the coldest month the difference between them gives us the annual range of temperature. We shall learn later that some places which have what we call an "oceanic climate" have a very small annual range—only about 5° or 6° F.: other places with a "Continental climate" may have an annual range of as much as 100°.

In geography you must notice that when we talk of the temperature of a place, we mean the temperature of the *air* at that place. We measure it by means of thermometers placed *in the shade* at about 5 feet from the ground.

We can, of course, measure the temperature of the ground or of water at different places, and find them quite different. You know on a hot day you feel that the air is very warm, but you touch a stone and find it is much hotter, or put your hand in some water and find it cooler. It is characteristic of land that it gets hot quickly (as during the day when the sun is shining), but loses its heat quickly (as during the night). Water, on the other hand, takes much longer to get hot, but longer to get cold.

How is the Air heated?—You have learnt that the surface of the earth is heated by the rays of the sun. The air is heated partly by the rays of the sun as they pass through, but mainly by the land or water with which the air is in contact. In deserts where the ground gets very hot during the day but becomes cold at night, the air is also hot during the day but cool during the night, though the range of temperature of the air is not nearly so great as the range of temperature of the ground. The air over great

bodies of water, such as the oceans, has a much smaller range of temperature.

**The Zones.**—We have learnt that the heat received at the earth's surface from the sun gets gradually less as we move away from the equator. So the average temperature gets less and less, and we can divide the earth's surface into a number of zones. The hottest parts, on either side of the equator, form the Torrid or Tropical Zone; the coldest parts, around the two poles, form the Frigid Zones; between

the Torrid and Frigid Zones are the Temperate Zones. You have already learnt the meaning and position of the Tropic of Cancer, the Tropic of Capricorn, the Arctic and Antarctic Circles. Notice from Fig. 36 how these lines separate the zones.

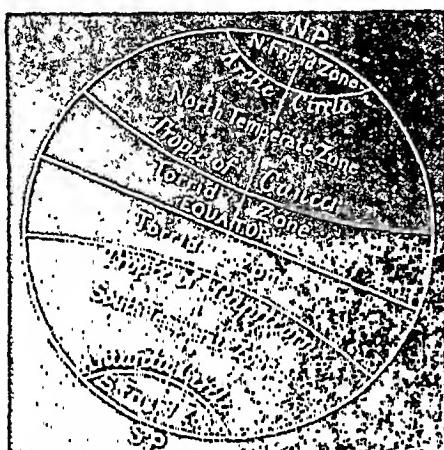
**Elevation.**—In the hot weather the Government of India moves from Delhi to Simla; the Government of Burma moves from Rangoon to Maymyo. In the hot

FIG. 36.—Diagram showing the heat zones of the world.

(From "Longmans' Geographical Series," Book II.)

weather many of the Europeans from Calcutta go to Darjeeling, from Madras to the Nilgiri Hills, and from Bombay to Kashmir. Europeans find it very difficult to live in India in the hot weather, and you find it difficult to work, and so you have your school holidays during the hot weather. But why should people go to places like Simla and Darjeeling and Maymyo? These places are all high up in the mountains, thousands of feet above the plains, and it is very much cooler there.

At first it seems funny that it should get cooler as you go upwards. You must think of the air as a lot of blankets, keeping the earth warm. A man living at sea-level has



the whole thickness of the air above him to keep him warm—just like a man sleeping under a pile of blankets. But when he climbs a high mountain he has much less air above him to keep him warm—just as if he had climbed above most of the blankets, and only had a few above to keep him warm. The earth is heated by the sun, but where the blanket of air is thin the warmth is quickly lost.

Roughly we find that for every 300 feet we climb upwards the temperature drops 1°, so that a place 3000 feet above sea-level will have a temperature 10° lower than a place near by on the plains. Now comes a very important point. The temperature of every place in the hills has what we call a "sea-level equivalent." For example, the average January temperature of Simla is 39° F. But Simla is 7200 feet above sea-level. If we could imagine Simla to be at sea-level it would have a temperature in January of  $39^{\circ} + \frac{7200}{300}$ , or  $39^{\circ} + 24^{\circ} = 63^{\circ}$  F. This is the sea-level equivalent. Again, Bangalore has a January temperature of 70°, and is 3000 feet above sea-level. If Bangalore could be brought to sea-level it would have a January temperature of  $70^{\circ} + \frac{3000}{300}$ , or  $70^{\circ} + 10^{\circ} = 80^{\circ}$  F. 80° F. is then the sea-level equivalent. Make quite sure you understand this before reading the next paragraph.

**Isotherms.**—Isotherm is a word which means "equal heat" or equal temperature. An isotherm is an imaginary line drawn through all places having the same temperature at the same time. We must remember that we can have isotherms for daily temperatures, monthly temperatures, yearly average temperatures, etc. The most important in geography are the mean monthly isotherms, especially for January and July. For example, a "January isotherm" is a line drawn to pass through all places having the same average temperature during January. You know, however, that there are many parts of the world where places on high mountains are very close to places on lowlands, e.g. Simla and Delhi, and these places have very different temperatures. If we tried to draw the actual isotherms we should find them very complicated. So in practice in

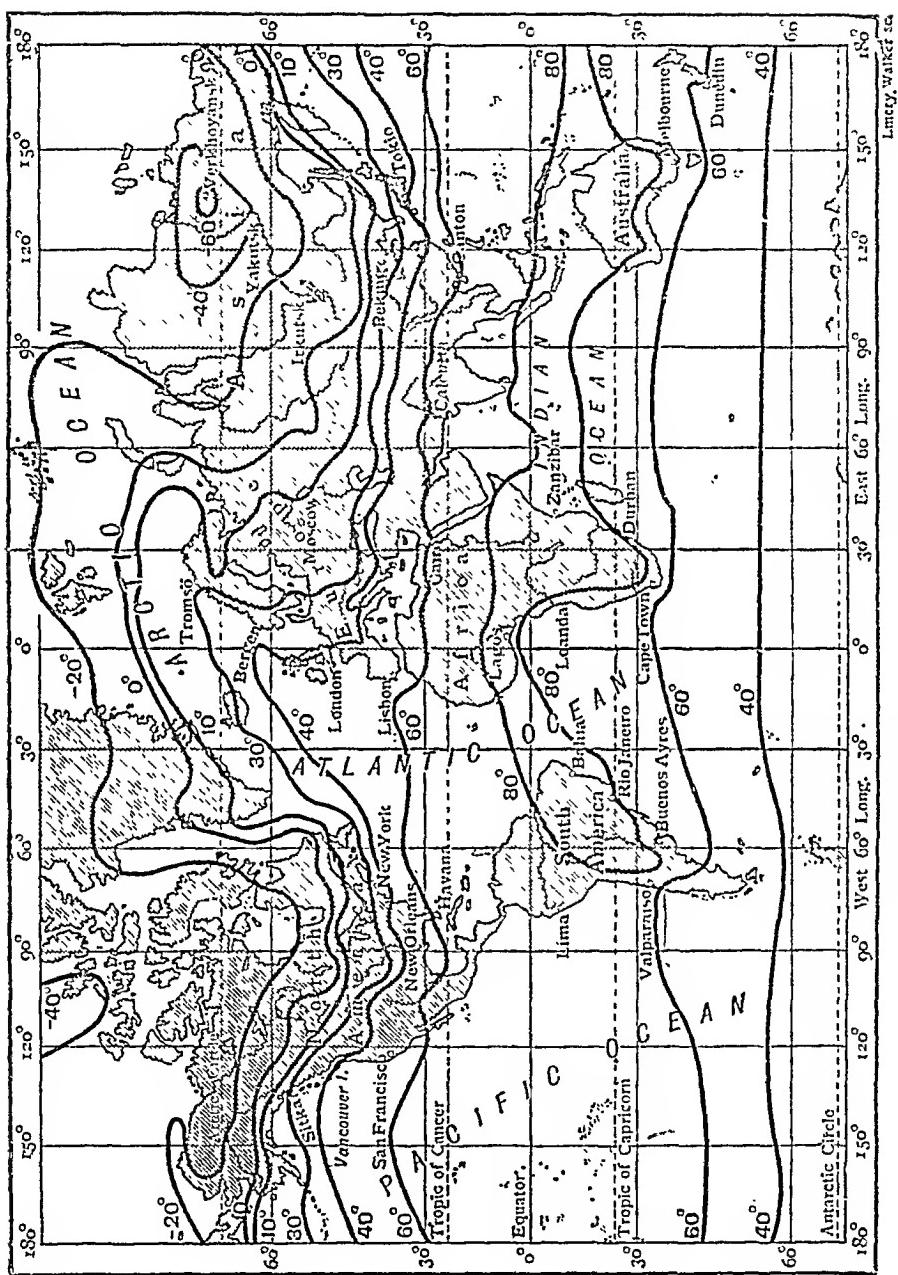


FIG. 37.—January isotherms of the world.  
 (From Longmans' "Geophysical Series," Book III.)

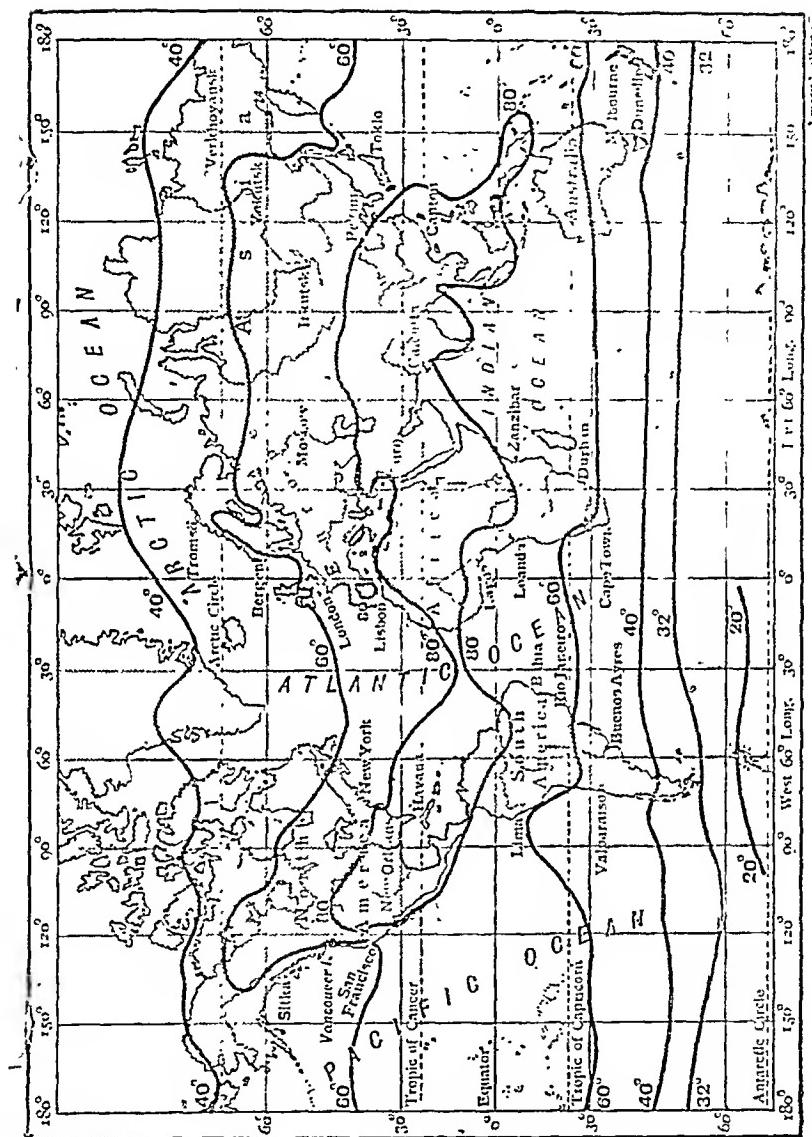


Fig. 38.—July isotherms of the world.  
(From Longmans' "Geographical Series," Book III.)

drawing isotherms, sea-level equivalents are always used and we must alter our definition to say that "an isotherm is an imaginary line drawn through all places having the same temperature, supposing them to be at the sea-level."

Look at Figs. 37 and 38. There you have the January and July isotherms for the world. These show us that the temperatures do not decrease gradually and steadily from the equator to the poles. In the Southern Hemisphere the increase is fairly regular, for there is much sea. In the Northern Hemisphere the presence of large land masses complicates matters and the isotherms are far more irregular. You will learn more about this important matter later.

#### MOVEMENTS OF THE ATMOSPHERE—WINDS.

Wind is the air in motion. The principal cause of winds is difference in pressure. Air always moves from a region of high pressure to a region of low pressure. You have already learnt the main belts of high pressure and low pressure on the earth, and as the regular winds result directly from these pressure belts, we will consider them at once.

Both the high-pressure belts are regions of no wind and so are called the Calms of Cancer and the Calms of Capricorn. The low-pressure belt round the equator is also a region of calm, and this belt of calms is known as the Doldrums. Although there are no regular winds there, violent thunderstorms are frequent. If the earth were still we should have north and south winds blowing direct from a place of high pressure to a place of low. But the earth is not still, it is rotating daily on its axis and moves from west to east (*i.e.* opposite to the direction in which the sun and stars appear to move). Just imagine for a minute a place on the equator. When the earth revolves once upon its axis, as it does every day, that place goes through about 25,000 miles—the distance round the earth at the equator. When we take a place north or south of the equator, that

place moves less than 25,000 miles per day. When we get to the poles the only effect of the earth's rotation is that the spot turns round once per day.

As a result of the earth's rotation, causing different parts to move at different rates, all winds are deflected. In this they obey Ferrel's Law, which states simply that winds are deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. Taking, for example, a wind blowing from north to south in the Northern Hemisphere. If one stands with one's back to the wind, it will be seen to be deflected to the right, and thus to become a north-east wind - as with the North-East Trades. Another law of world-wide application is Buys-Ballot's Law. This law states that if in the Northern Hemisphere you stand with your back to the wind, you will have lower pressure to your left than to your right. In the Southern Hemisphere, the reverse will hold. Notice very carefully that the winds are named after the direction from which they come.

**Trade Winds.**—Now we can study the regular wind systems of the globe. Within the tropics, that is, in the Torrid Zone, we have winds blowing from the high-pressure belts towards the equator. These are the very important Trade Winds. They were given this name by Europeans in the days of sailing ships because the North-East Trade Winds blew the European vessels across to the rich lands of the West Indies, and so helped trade with those lands. North of the equator we have the North-East Trade Winds, south of the equator the South-East Trade Winds.

These winds are usually very regular and constant, especially over the sea, but you must note that the position of the high-pressure belts changes somewhat according to the season. During our rainy season, that is in June, the sun is shining vertically over the Tropic of Cancer—that is, north of the equator—the high-pressure belt with the Calms of Cancer is found well to the north, and lands as far north as  $45^{\circ}$  come within the influence of this belt. At the same time of year the Calms of Capricorn are in their northern-

most position. In other words, the whole wind system of the world swings northward with the sun. In our cold weather, on the other hand, when the sun is shining vertically over the Tropic of Capricorn, the whole wind system swings southward. Study this very carefully in the Fig. 39.

**Anti-Trade Winds.**—These winds blow outside the Tropics, in the Temperate Zone. In the Northern Hemisphere they blow mainly from the south-west (South-West Anti-Trades), in the Southern Hemisphere mainly from

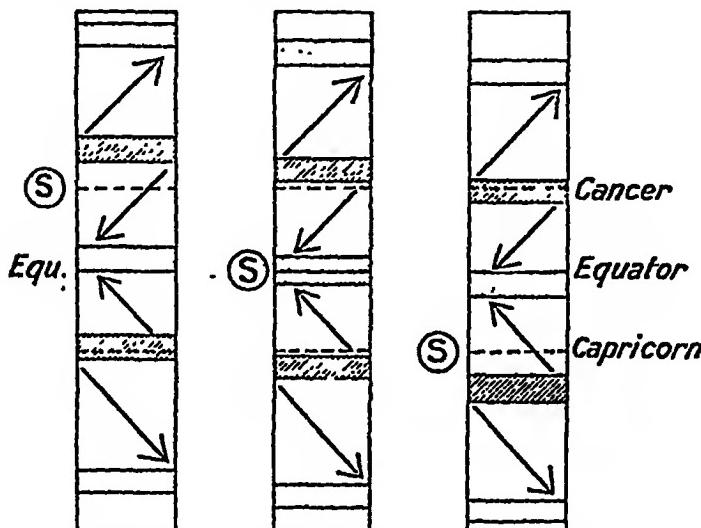


FIG. 39.—Diagram showing the swing of the wind systems.

S = the Sun; the first column shows the position of the sun vertically over Cancer in June; the third column vertically over Capricorn in December.

the north-west (North-West Anti-Trades). They are not so constant in strength or direction as the Trade Winds, and are often called just "Westerlies." Notice that they swing north and south, too, according to the seasons. They are more regular in the Southern Hemisphere, where they are not interrupted by land masses, and may become so strong that between latitudes  $40^{\circ}$  and  $50^{\circ}$  they are known as the "Roaring Forties."

**Polar Winds.**—During most of the year bitterly cold winds blow from the poles towards temperate regions.

Where there are no mountain chains to interrupt them, these winds often cause the climate to be bitterly cold even far to the south as they do in the central plains of North America.

**Periodical Winds.**—*Land and sea breezes*—During the day the land becomes more quickly heated than the sea. Consequently the air over the land becomes more heated too. It expands and becomes lighter, so that it

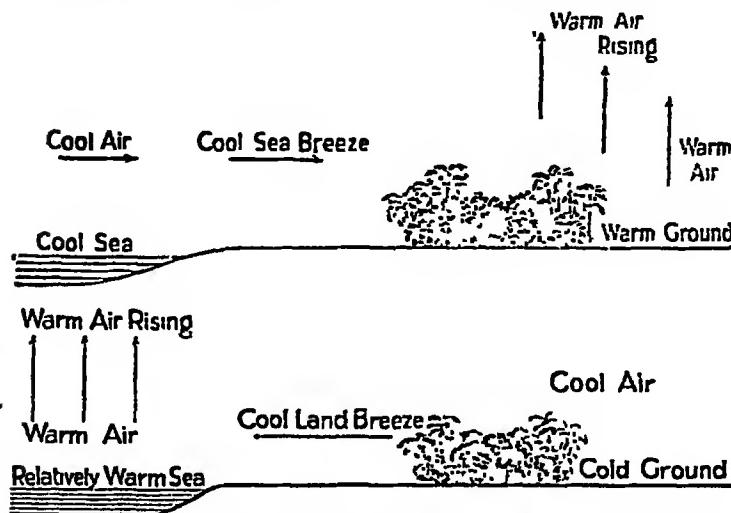


FIG. 40.—Diagram showing the cause of a cool sea breeze by day (upper diagram) and a land breeze by night (lower diagram).

is pushed upwards by cooler and heavier air flowing in from the sea. This causes a sea breeze. Many places in India on the sea-coast would be very hot were it not for this cooling breeze from the sea. During the night the land cools more rapidly than the sea, and some hours after sunset the air over the land is colder than the air over the sea, with the result that the cool, heavy air from the land flows out to sea as a land breeze.

**Monsoons.**—In the last paragraph you learnt how the land in getting very hot during the day caused the air

above it to get hot and expand. The cool air from the sea which takes its place causes a sea breeze. On a very much larger scale you can imagine the air over a great mass of land becoming very hot during the hot weather so that it expands and a great cool wind flows in from the sea and takes its place. This wind is a monsoon wind. "Monsoon" comes from an Arabic word "mausim," meaning season; and in India we often talk about the monsoon as the same as the rainy season. In geography books "Monsoon" usually means the *wind* which blows at this time. In India in the hot season the sun is shining vertically over the Tropic of Cancer—that is, roughly over the great plains of the Indus, Ganges, and Brahmaputra, until about May the air has become very hot. Normally at this time the North-East Trade Wind—or the North-East Monsoon as we often call it in India—is blowing, but the expansion of the hot air causes this wind to die down and the South-West Monsoon commences to blow from the opposite direction. This change is accompanied by severe thunderstorms. Monsoon winds do not, of course, always blow from the south-west. Even in India the high mountain ranges change the direction of the winds. It is easier for the wind to blow parallel to the mountain chains than across them. In China the great land mass is to the north-west and the sea to the south-east. So the monsoon blows from the south-east. India, Indo-China, China, and North-West Australia are the most important monsoon countries; but monsoon winds are also found in other parts of the world. Look carefully at a map of the Indian Ocean. You should notice that the South-East Trade Wind advances right across the equator and becomes the South-West Monsoon in India. During our cold season the North-East Trade Wind (or North-East Monsoon of India) crosses the equator and becomes the North-West Monsoon of Australia.

**Local Winds.**—The presence of high mountains, hot deserts, etc., often causes special winds, which receive special names in different parts of the world and about

which you will learn later. Some of them, like the Sirocco which blows from the Sahara Desert across to Italy, are very hot; others which blow down from the mountains are very cold. Sometimes, however, the air descending from mountain regions is warmed by compression and forms the warm "föhn" winds.

### The Wind Systems of the World.—The arrangement

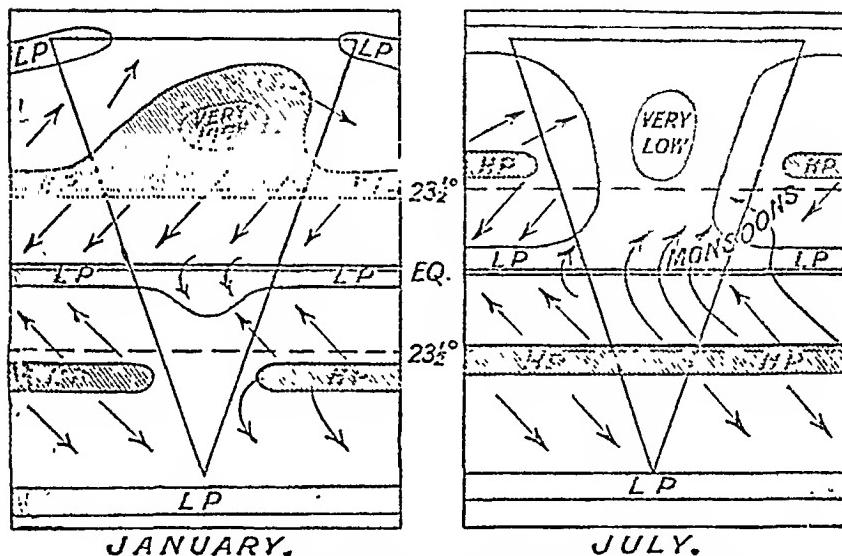
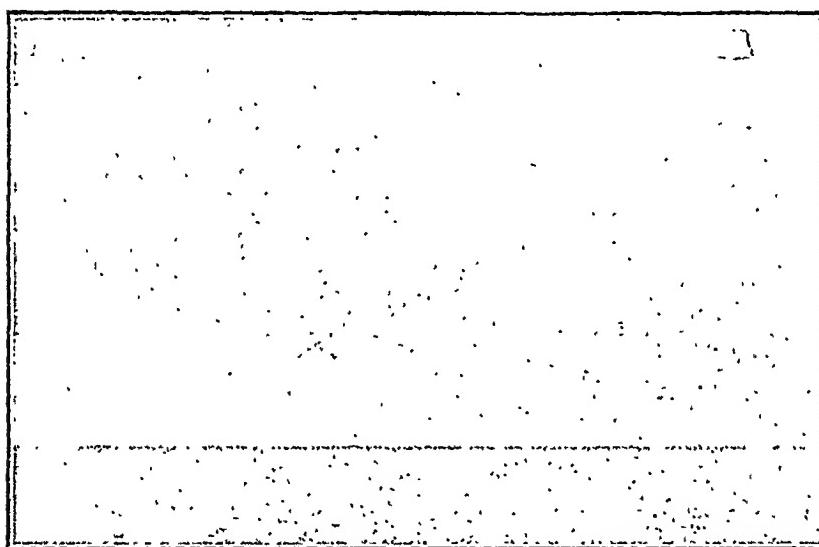


FIG. 41.—Diagram showing the effect of land masses (represented by triangles) on the pressure belts of the world.

of the pressure belts and winds shown in Figs. 32 and 39 is that which would exist if the surface of the earth were all the same—*i.e.* completely covered by water or completely occupied by land. Owing to the different rates at which land and sea become heated or lose heat, the pressure belts and wind belts are actually much less regular. This is shown diagrammatically in Fig. 41, which should be studied very carefully.

### CYCLOCNES (DEPRESSIONS) AND ANTI-CYCLOCNES

You have learnt that there are two main belts of high pressure round the world. In all parts of the world, however, but especially in the temperate regions, there are local areas of high pressure surrounded by regions of low pressure, or small regions of low pressure in a belt of high pressure. Perhaps some of you have watched the waters of a river on their way to the sea. You know that the main



[Photo: L. D. Stamp.

FIG. 42.—A waterspout at sea (Baltic Sea, September, 1925). In the centre of a severe local storm a column of water is seen joining cloud and sea.

current of water is towards the sea, but in some places the river runs swiftly, in other places very slowly, and in other places there are little eddies where the water swirls round and round as if it never meant to reach the sea. It is just the same with the wind belts of the world, especially in the belt of the Westerlies. These little air swirls are caused by differences in pressure and are called cyclones or depressions and anti-cyclones. A cyclone has a low-

pressure centre, an anti-cyclone a high-pressure centre. Cyclones of two types may be distinguished. There are the intense local cyclones or revolving storms of tropical latitudes, and the cyclones or depressions and (anti-cyclones) which determine the daily weather of most countries in temperate latitudes.

*Tropical cyclones* are small depressions having nearly circular isobars and very strong winds whirling round the centre or "eye" of the storm, with a counter-clockwise motion in the Northern Hemisphere and a clockwise motion in the Southern. They are known simply as cyclones in the Indian Ocean, as hurricanes in the West Indies, and as typhoons in the China Seas. They originate within the tropics, especially where warm seas are studded with islands, and are believed to be due to differential heating. A centre of low pressure would be formed over an island under the intense heat of the tropical sun. In the tropics cyclones usually occur at certain periods--especially at the beginning and end of the monsoons in the Indian Ocean. So dangerous are the cyclones that they are avoided by even the largest liners. The very intense local cyclonic storms known as tornadoes have a path rarely exceeding a quarter of a mile in width : the storm dies away after a destructive passage of twenty or thirty miles. Within this path almost everything is destroyed : buildings and trees are blown down, and heavy objects are sometimes carried to a considerable distance. Tornadoes are specially feared in some parts of the south-eastern United States. When these violent storms occur at sea the funnel-shaped cloud which is formed by the whirling motion of the wind sometimes descends to the surface, draws up the water, and connects it with the cloud above, forming a column of water known as a waterspout. A similar action to this in the deserts of the world produces the dreaded sand-sprouts, associated especially with the Sahara. In the hot season, in the dry parts of India, violent dust storms occur and may sometimes be seen whirling along with a noise like that of an express train.

*Temperate Cyclones and Anti-cyclones.*—Fig. 43 shows the arrangement of isobars and winds in a cyclone and anti-cyclone in the Northern Hemisphere.

The word “isobar” has already been used several times. It means “equal weight” and isobars are imaginary lines drawn through places which have the same pressure at the same time. Just as *actual* temperatures have to be reduced to their sea-level equivalents before isotherms can be drawn, so *actual* pressure readings

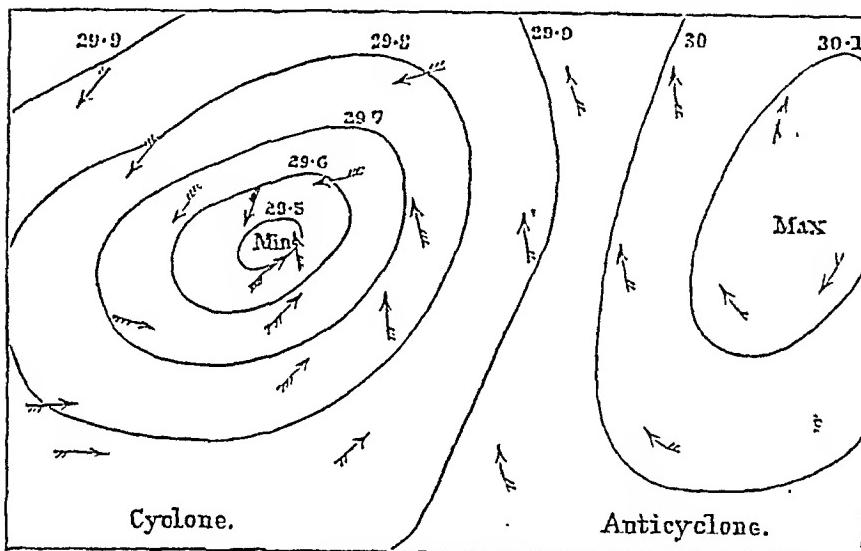


FIG. 43.—Diagram of the isobars and winds in a cyclone and an anti-cyclone (Northern Hemisphere).

have to be reduced to sea-level equivalents before isobars can be drawn. Just as the whirls and eddies in a stream are caused by the current of water being retarded by friction along the banks, so the cyclones in temperate latitudes are due, at least in part, to the current of air in the westerly wind belts rubbing against the cold mass of air surrounding the poles—the edge of which is known as the Polar front.

Cyclones with their in-blowing, anti-clockwise winds (reversed in the Southern Hemisphere) bring wet, stormy

weather, cold in summer, but warm in winter; anti-cyclones are associated with fine weather, but often cold and foggy in winter. So the weather in countries like England changes from day to day according to whether there is a cyclone or an anti-cyclone over the country. It does not stay the same for weeks together as ours does.

### MOISTURE OF THE ATMOSPHERE

In addition to the oxygen and nitrogen of which the air is composed, there is always a quantity of water vapour present. This water vapour is obtained by evaporation of water on the earth's surface. Heat is the great cause of evaporation, and evaporation is therefore greatest near the equator. Water vapour is only just over half as heavy as air, and so it is rapidly distributed by the wind.

Sometimes in the hot weather you know you are very thirsty and feel as if you could go on drinking and drinking. But there comes a time when you have had enough. It is just the same with the air. Hot air is very thirsty and can drink up large quantities of water vapour, but there comes a time when the air cannot take up any more. The air is then said to be *saturated*. You can easily tell whether the air is very dry or nearly saturated. Sometimes in the hot weather, when you have been running and feel very hot, you can watch the drops of perspiration on your arm. They do not stay there very long; they quickly evaporate into the air and disappear. That is because the air is dry and thirsty. Hang up a wet piece of cloth or handkerchief in the hot season and see how quickly it gets dry. But on a hot day in the rainy season you will find the perspiration evaporates very slowly, and the piece of cloth or handkerchief may never get quite dry unless we put it near a fire. That is because the air is damp and nearly saturated, and so cannot take up any more water vapour.

Just as we have a thermometer to measure the exact temperature of the air, so we can measure the exact "dampness" of the air. The term we use for dampness is

"Relative Humidity." When the air is quite saturated its relative humidity is said to be 100; when it is quite dry it is 0. In the rainy season the relative humidity is often as high as 80, in the hot season often as low as 50. Now hot air can hold much more water vapour than cold air, so that when warm damp air is cooled, the saturation point is soon reached and *condensation* takes place.

Evaporation is the name we give to the change from liquid water to water vapour; the opposite change is called condensation. Your breath is warm and contains a large quantity of water vapour. On a cold day, breathe on to a looking-glass or a plate. It will immediately become cloudy, because the water vapour from your breath has condensed as little drops of water.

The clouds which you see in the sky are formed in very much the same way. The warm moist air rises from the surface of the earth, it expands and becomes cooler, with the result that the saturation point is passed and the water vapour condenses as little drops of water which appear to us as clouds. The little drops collect together as bigger drops which may fall as *rain*. Sometimes the drops evaporate again before they reach the surface of the earth, and we may have clouds without rain. When the upper layers of the air are cold, little pieces of ice may be formed instead of drops of water and fall to the ground as *hailstones*. We do not often see hail in India; when we do, the hailstones are often very big and so have not had time to melt before reaching the ground. In still colder regions the water vapour condenses as feathery crystals of ice called *snow*. In India only those who are fortunate to go up into the mountains, where it is very cold, see snow, but in the colder parts of the world snow falls much more often than rain, and in the coldest regions rain never falls at all.

Dew.—You have learnt that at night the earth may become cooler than the air above it. This causes the vapour contained in the air to be condensed and deposited on the cooled surface. You have probably seen in the

early morning the grass and ground quite wet. This deposit of water is called dew. In cold countries the surface of the earth at night may become colder than 32° F., and the deposit is frozen and called *hoar-frost* or rime. More dew is usually found on clear nights than on cloudy nights, for clouds prevent the surface of the earth from cooling so rapidly.

**Fog and Mist.**—When the water vapour is condensed but remains suspended in the air near the surface of the earth like a cloud, it is called a mist or fog. A mist is really exactly the same as a cloud near the ground. In a fog the particles of water are smaller than in a mist.

**Precipitation.**—This is a general term which includes both rainfall and snowfall.

**Essentials for Rainfall.**—In order to have rain two important conditions must be satisfied. Firstly, we must have moisture-laden air; secondly, there must be some means whereby the air is cooled and condensation takes place. The air obtains its water vapour by evaporation from the surfaces of great areas of water, usually from the sea. This moisture-laden air may be cooled in two principal ways :

(a) by rising upwards into the colder upper regions of the atmosphere ;

(b) by being blown as wind to colder regions.

At the equator evaporation is very great, and as you have learnt, moist air is lighter than dry air and so readily rises. It soon expands, cools, and rain falls. Rains which originate in this way are called *Convectional Rains*. This explains the very heavy rainfall all the year round which is found in the Equatorial Belt. Evaporation is greatest near the equatorial belt, and that is one reason why rainfall is greater than in temperate regions. Apart from convectional rains, the rainfall of a country or a place depends upon the following factors :

(1) The Direction of the Prevalent Winds. When warm winds blow towards a cooler region, the decrease in temperature causes condensation and rain falls. The

**Rain-Gauge.**—Rainfall is measured by means of a rain-gauge. All the rain which falls over a certain small area passes into a funnel, and is collected in a jar where it cannot evaporate and where it can be measured: when we say that the rainfall for one day has been 2 inches, we mean that if all the rain which fell that day had remained where it fell, it would have formed a layer two inches deep. In nature, as you know, as soon as the rain falls, some of it sinks into the ground, some of it evaporates, and some runs into the streams and rivers. That is why we use a rain-gauge to measure the total quantity which fell. Just as in recording temperature we took the readings every day, so we do with the rain-gauge. We note the amount which falls every day, and then by adding up the amounts for each day we get the monthly amounts. The most important figures are the *monthly averages*.

**Rainfall Maps.**—On a map of any country we can mark the monthly or yearly averages. Sometimes it is better to use the amount for a season, such as the rainy season. Fig. 45 is a map of the world, which shows you the rainfall for the months of June to August, when we have the rainy season in India. On any rainfall map we can draw lines through places having the same rainfall; these lines are called "isohyets." You must remember that the rainfall changes gradually. You cannot have one region with a rainfall of more than 80 inches, and the next region less than 40. There must be an area between, even if it is only a narrow strip, having a rainfall from 40 to 80 inches.

**Remembering Rainfall.**—You cannot remember the exact figures for rainfall, it is too difficult.

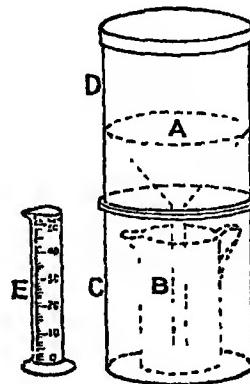


FIG. 44.—Picture of a rain-gauge.

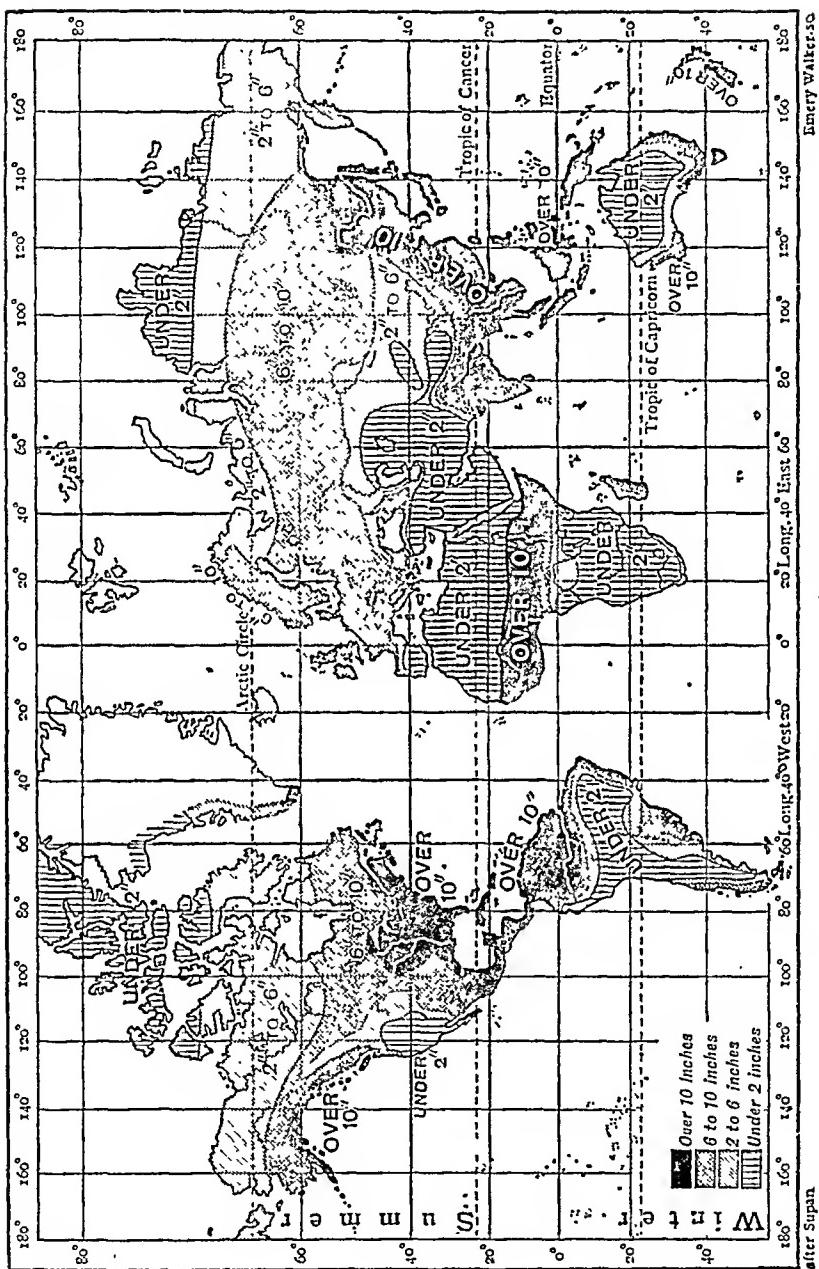


FIG. 45.—Rainfall map of the world (Northern Summer).  
(From Longmans' "Geographical Series," Book III.)

after Supan

Try to note :

- (a) the time of year when most rain falls :
- (b) whether the rainfall is heavy, moderate, poor, or very poor.

In the Tropics above 80 inches is heavy, 40 to 80 moderate, 15 to 40 poor, and below 15 very poor.

In temperate regions both evaporation and rainfall are less. Above 40 inches is good, 15 to 40 moderate, 5 to 15 poor, below 5 very poor.

### WEATHER

We have now learnt quite a lot about the atmosphere. We have learnt about pressure and the barometer, about temperature, winds, moisture, rainfall, etc. If we think of any one day, all these things put together make what we call the Weather. Sometimes one seems more important than the other and we can say it is wet weather to-day, or perhaps it is very cold weather, or cloudy weather. We can talk, too, about the weather for the week or month. Sometimes for a whole week we may have very stormy weather. In India the weather does not change very quickly. In the middle of the Cold Season we sometimes have a wet day, but not very often. In other countries such as the countries of Europe every day may be quite different. In England one day may be wet and cold, the next day cloudless, sunny, and quite hot. In such countries everybody is very interested in the weather and many of the newspapers publish every day little maps (called weather charts) showing the state of the weather. In India sailors have to watch the weather for storms, and it is important to paddy growers and other farmers.

### CLIMATE

Climate is the average of the weather. We must be quite sure we understand what that means, because climate is one of the most important subjects in geography. In

India, as you know, we have a "Monsoon". There we can divide the year into Cold Season, Hot Season and Rainy Season. Every year there are these seasons. In some years the rain during the rainy season is very abundant and we say the monsoon is heavy. In other years not nearly so much rain falls. But that does not make any difference to the truth of the statement that every year has its rainy, cold, and hot seasons. Sometimes we may have a hot day in the midst of the rains, but we can say that the weather for that day is exceptional. But one exceptional day does not alter climate, because the climate refers to the normal or usual condition of the weather. If we observe every year carefully for many years the amount of rain which falls during any particular month or during the rainy season, we can get the *average rainfall*; in the same way we can find the average temperature, pressure, humidity, wind direction, etc. The averages for a month, for a season, or for the year—all the averages considered together will tell us of the *climate*. You see that weather refers to a short period such as a day or a week, but climate refers to the normal conditions over many years.

We have learned of the factors which go to make climate and later we shall consider the principal types of climate of the world. Before we do this we must remember that climate varies from place to place; the whole of India has a monsoon type of climate and has the same three seasons, but some parts are much wetter than others. When we deal with India in detail we shall be able to divide the country up into smaller regions according to climate, although the whole of the country has a monsoon type of climate.

## C. THE HYDROSPHERE

Hydrosphere is the name we give to the envelope of water which covers a great part of the surface of the globe. The great stretches of salt water we call oceans; the smaller areas are seas, but we often talk about the "ocean" or the "sea" as meaning the whole. The great land masses are the continents, the smaller islands. The hydrosphere also includes lakes—stretches of water surrounded by land. Seas and oceans occupy more than two-thirds of the whole surface and are two and a half times as extensive as all the great continents put together. The average depth of the oceans is nearly  $2\frac{1}{2}$  miles. We nearly always measure the depth of the water by *fathoms*, each fathom being 6 feet, and exactly the average depth of the oceans is about 21 fathoms. This seems very deep to us—it is about equal to 2270 men standing one on top of the other—yet is very small compared with the great size of the earth. If the school globe 1 foot in diameter it would be shown as a thin film of water only  $\frac{1}{250}$  of an inch in thickness. A thin film like this would be left if you simply pour a puddle of water on the globe, letting all the waste water run off.

**The Water Cycle.**—You all know that water when it is made very cold changes into ice, when it is made very hot it boils and passes into steam. You know too that on a sunny day a pool of water on the road quickly dries up and disappears. When a puddle of water appears to dry up like this, the water really is changed into a gas—called water vapour—and passes into the atmosphere. You have already learnt about the water vapour in the

atmosphere. Just think what changes are continually happening to the waters of the earth. Over the ocean, especially where it is hot and the sun is shining, great quantities of water are evaporated and pass into the air as invisible water vapour. The air rises and cools, and the water vapour condenses to form clouds. The clouds are

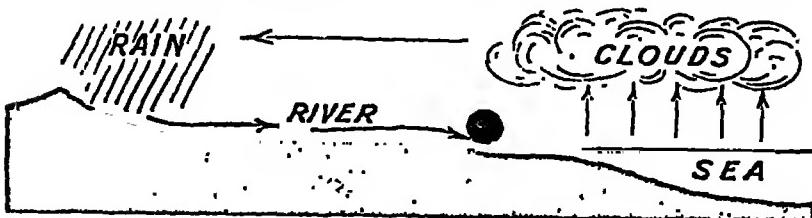


FIG. 46.—The water cycle.

blown on to land masses and the water falls to the earth as rain or snow. Much of the rain-water collects to form streams and rivers which carry the water back into the sea. There is, then, a movement of water in a circle, starting from the sea and finishing in the sea. We can call this the "Water Cycle."

#### THE WORLD OCEAN

The oceans occupy the deep hollows of the earth's crust. Look at a map of the world coloured to show the depth of the ocean and notice that enormous stretches are between 2000 and 3000 fathoms in depth. The floor of the ocean is much more level than the surface of the land. There are many broad ridges where the ocean-floor rises and the water is much shallower, but it is very rarely that we find steep-sided mountains or deep valleys in the ocean bed. That is because the denuding agents such as frost and running water which carve the earth's surface into mountain and valley are not at work on the ocean bed. We shall learn later, too, that a mantle of marine deposits is continually being spread over the ocean floor and this helps to fill up hollows and irregularities. There

are certain regions where the ocean is very deep indeed, and these regions are called "troughs" or "deeps." The most famous deeps include the Japan or Terasuora Deep (off Japan) and the Challenger Deep in the west Pacific. The latter is so deep (5269 fathoms) that if the highest mountain in the world were placed in it, it would still be covered by half a mile of water.

Look again at the same map and notice the fringe of shallow water up to about 100 fathoms, or 600 feet, in depth which surrounds the continents. This portion of the sea floor is called the *Continental Shelf* and probably represents the former extent of the continents, the land having been

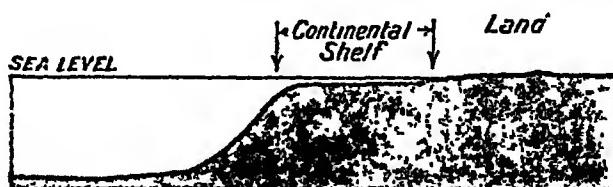


FIG. 47.—Section through a continental shelf.

worn away by the denuding action of the sea. Sometimes the continental shelf is broad, sometimes narrow. As a rule when mountains occur near the ocean the continental shelf is narrow and one passes rapidly from high land to deep water. From the edge of the continental shelf the level of the sea floor drops rapidly and the slope is called the continental slope. Study Fig. 47 carefully.

**The Oceans.**—All the oceans of the world are connected, and so in talking of them all we often use the term the "World Ocean."

Around the South Pole is the continent of *Antarctica*, surrounded entirely by a great stretch of water which is often called the Southern Ocean. From here the three most important oceans stretch northwards—the Indian, Pacific, and Atlantic Oceans.

The Indian Ocean is smaller than the other two and is closed in on the north by the continent of Asia. On

the west is the continent of Africa, and on the east the East Indies and Australia. The Indian Ocean is thus surrounded by continents and islands on three sides. Contrast this with the other two.

The Pacific Ocean is the largest. It is surrounded by a rim or girdle of high mountains, and close beneath these mountain chains are long narrow troughs. The remainder of the floor is fairly level but deep, and is remarkable for the large number of small islands. The islands are mainly composed of coral, but are probably built up on volcanoes which have broken through the floor of the ocean.

The Atlantic Ocean is much narrower and stretches right to the Arctic Ocean without any interruption. It separates the Americas on the west from Europe and Africa on the east. Although it is so much narrower there is, running down the centre, a long ridge covered by less than 2000 fathoms of water. On either side there are deeper troughs. There are only a few islands in the Atlantic.

The Arctic Ocean surrounds the North Pole. Owing to the intense cold a great part is frozen over the whole year.

#### SALINITY

You all know that sea-water tastes salt. Indeed it is so salt that it is quite impossible to drink it, and shipwrecked sailors have been known to die of thirst in the midst of the sea.

Sea-water contains on an average 35 parts of salt in 1000 parts of water. If we remember the enormous quantity of water in the oceans, it is not difficult to realise the huge quantities of salt dissolved in it. We believe that the sea gets slightly salter every year because the rivers, although we call their water fresh, bring down small quantities of salt. When sea-water evaporates to form water vapour the salt is left behind and rain-water is quite fresh. Look again at Fig. 46, notice that the

rain-water and rivers dissolve salts from the earth and that they are carried into the sea and left there.

Some parts of the ocean are saltier than others, or as we say, the salinity is higher. The salinity in seas and oceans ranges from over 40 parts per 1000 in the Red Sea to about 30 in Polar seas. Near the mouths of rivers or in enclosed seas receiving many rivers (like the Baltic) the salinity is very much less.

**Distribution of Salinity.**—You will learn that near the Tropics of Cancer and Capricorn, that is, on either side of the equator, there are two belts of deserts. In these belts there is little or no rain and little wind, and the temperature in the hot seasons of the year is very great. These deserts are continued into the ocean, where we find areas where the salinity is very high—large areas are more than 36 or 37. These are due to the great heat and evaporation, the lack of fresh water from rain and over large areas to the absence of currents. Along the equatorial belt the evaporation is very great, but much fresh water falls as rain—and this belt is not quite so salt. In this belt, too, many of the great rivers of fresh water, like the Amazon, Congo, and Niger, enter the ocean. From the Tropics of Cancer and Capricorn, as we go polewards, the water gradually gets less and less salt. Notice how some of the enclosed seas are very salt, others very fresh. The Red Sea is very salt because there are no large rivers entering into it, and the evaporation due to the sun's heat is very great. The Baltic and Black Seas are very fresh because large rivers enter into them, but the evaporation is very small. Salt water is heavier than fresh water and so sinks, with the result that the surface layers of some seas are fresher than lower layers.

**Salts of the Sea.**—Out of the normal 34 or 35 parts of salt per thousand, 27 parts consist of common salt or sodium chloride. But there are very many others. Seawater is able to dissolve very, very small quantities of most substances. There is, for example, a very tiny proportion of gold in sea-water. The quantity is so small

that no one has been successful in obtaining gold from the sea. Yet it is probable that about one thousand million tons of gold occur in the whole of the ocean waters in this way. An important salt dissolved in sea-water is calcium bicarbonate. This substance is drawn from the water by animals such as the coral organisms and the molluscs in order to build up their hard parts. To obtain the salt from the sea, we need only evaporate the sea-water—we may boil the water in a basin or pan and the salt crystals are left behind. Much salt is obtained in India in this way.

Then there are gases dissolved in sea-water. All animal life requires oxygen in order to live ; those living on land obtain it from the air, but the inhabitants of the seas obtain it dissolved in sea-water. The plants of the sea—seaweeds—require carbon dioxide just as do the plants of the land, and they obtain it dissolved in sea-water. Nitrogen and other gases also occur in sea-water, but in a smaller proportion than in the air.

#### TEMPERATURE

The temperature of the sea is much more uniform than that of the land. This is for two reasons :

1. Water is not heated so readily by the sun, but takes longer to cool.
2. The waters of the ocean are constantly moving and mixing.

The temperature is, however, by no means always the same. It varies in four ways :

- (1) The surface temperature varies from equator to the poles.
  - (2) The surface temperature varies annually with the seasons.
  - (3) The surface temperature varies daily.
  - (4) The temperature of the seas and oceans varies with the depth.
- (1) In the equatorial regions the surface temperature

is more than  $80^{\circ}$ ; on the whole it gets steadily less and less until it is below freezing point in the polar seas. We must remember that the freezing point of salt water is lower than that of fresh water, and so the ocean around the poles has to be cooled below freezing point before it commences to freeze. The highest known temperature reached by the waters of the ocean is  $96^{\circ}$  (in the Persian Gulf). It has reached  $91^{\circ}$  in the Red Sea. The lowest recorded is  $26^{\circ}$  in the polar seas. Thus the extreme range is only  $70^{\circ}$  compared with an extreme range for the air of about  $200^{\circ}$ , and for the land still more.

(2) The ocean is naturally warmer in the hot season than in the cold. In equatorial regions, where the air is hot the whole year, the surface of the ocean is hot, too, and the seasonal range is less than  $10^{\circ}$ . In the polar regions the surface is very cold all the year, and again the range is less than  $10^{\circ}$ . It is in temperate regions that we find the greatest differences. Owing to the swing of the wind systems there are parts of the ocean near New York and in the Sea of Japan which in the cold season are under the influence of a cold current, but in the hot season are under the influence of a warm current. Here the annual range may be more than  $50^{\circ}$ .

(3) Water becomes heated much more slowly than land, and also loses its heat more slowly. The brief space of one day's sunlight is not sufficient to heat the great mass of the ocean, and the daily range of temperature in all parts of the ocean rarely exceeds  $1^{\circ}$ .

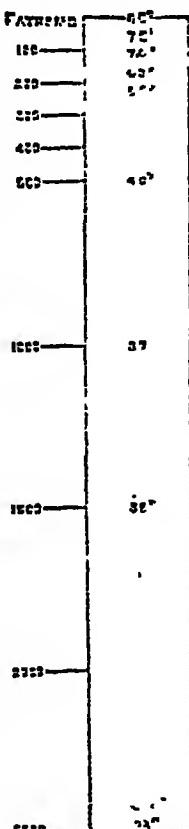


FIG. 49.—Section showing the temperature of sea water.

(From Longmans' "Geographical Series," Vol. V.)

(4) Warm water is lighter than cold, and so we find that the cold heavy water sinks to the bottom of the ocean and the warmer waters only form a very thin layer on the surface. Nearly all over the world the temperature of the water at the bottom of the oceans is about  $34^{\circ}$ . Look at Fig. 48 and notice how quickly the temperature decreases as we go downwards. Even near the equator it has dropped from  $80^{\circ}$  to  $50^{\circ}$  at a depth of 200 fathoms. In seas which are cut off from the open ocean the water is undisturbed by currents, and the temperature is nearly uniform except just at the surface.

In some respects water is quite different from nearly all other substances. When it is made very cold and freezes, the solid water or ice occupies more space than the original water. That is, water *expands* on freezing and so the ice is lighter than water. You all know this, since ice floats on water. This is very fortunate; were it not so the ice might start forming at the bottom of the ocean and go on until the whole ocean waters froze - except a very thin layer at the top.

**Sea Ice.**—Most of the great icebergs of the polar seas are derived from land ice, about which you will learn in a later chapter. But over large areas the sea itself freezes in the cold season, but is free from ice in the warmer part of the year. At first little cakes of ice (called panakee ice) appear on the surface of the water. These gradually increase in size till they join up and form a continuous sheet of ice (ice-field). This sheet, however, is later broken by waves and wind, and forms a thick jumble of blocks of ice which is called "pack-ice." The pack-ice gradually melts and disappears in the hot weather. Ice may also be formed growing out on the surface of the sea like a shelf from the land—this is called an ice-foot.

#### MOVEMENTS OF THE OCEAN

**Waves.**—When the surface of the sea is disturbed, waves are produced. You can make small waves by

dropping a stone into a pool of water. The waves move outwards from the spot where the stone fell. Although the waves travel outwards the water does not—it simply rises and falls. You can see this if a piece of wood or cork is floating on the water. It moves up and down when the waves pass, but it is not carried along. Waves are caused mainly by the wind striking on the surface of the water. It is only near the shores that the water actually moves forward. The bottom or trough of the wave is partly stopped by the sand and rocks of the bottom, the top or crest of the wave falls over and breaks as surf. Although in great storms the height of the waves may be as much as 50 feet, their effect is only felt on the surface. At a depth of 200 or 300 fathoms it is probable that the water is undisturbed by the biggest storms. The height of a wave is the distance from the trough to the crest, the length is the distance from one crest to the next. In a later chapter you will learn of the destructive action of waves on the land.

**Currents.**—The movement of water from one part of the ocean to another gives rise to *currents*. The most important currents are the surface currents which are largely caused by the great wind systems of the globe. Careful observations on empty bottles thrown into the oceans, or on the drift of icebergs, etc., enable us to determine the directions of the principal currents and to make maps showing them. Currents also carry seed-pods, logs of wood, etc., from one country to another, and the coconut palm has spread to nearly all the small islands of the Pacific Ocean in this way. We also have bottom currents (or movements of water along the sea floor) as well as currents downwards (due to the sinking of cooled water) and currents upwards due to the up rise of warmer water. There are also local currents due to the tides or to differences in evaporation and salinity. The water in the equatorial regions becomes hot and tends to flow polewards as warm surface currents, while the colder water from the poles creeps along as bottom currents to take

its place. The great evaporation in the hot regions causes bottom currents of cold water to flow in below and replace the loss. The currents do not flow north and south, but are deflected according to the rotation of the earth and the prevalent winds.

**Cold Currents and Warm Currents.**—When a current is flowing from a warmer region to a colder it is naturally a warm current. When it flows from a colder

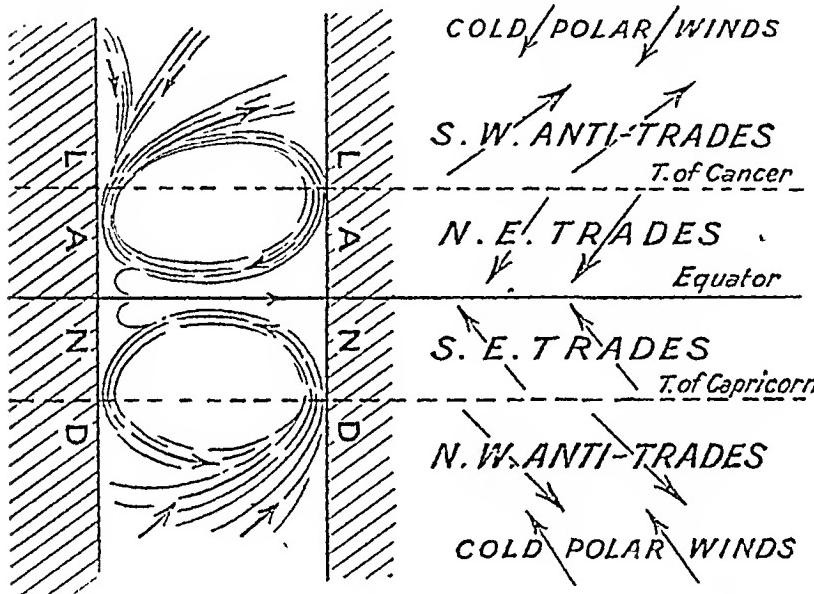


FIG. 49.—The general arrangement of currents and winds.

to a warmer it is a cold current. Notice that a warm current may swing round and become a cold current.

**The Currents of the Oceans.**—There is the same general arrangement of currents in the Atlantic and Pacific and South Indian Oceans. The northern part of the Indian Ocean is somewhat different, as it is enclosed by land and is affected by the S.W. Monsoon during the rainy season. In the cool and hot seasons the currents are generally similar in their arrangement to those in the North Atlantic or Pacific Oceans.

The ocean currents are like the winds. They do not flow directly from north to south or from south to north, but are deflected according to Ferrel's Law by the rotation of the earth. Study Fig. 49 carefully.

Notice in Fig. 39 the main wind systems and in Fig. 49 how the general arrangement of the ocean currents agrees with that of the winds. In the westerly wind belts we have currents from the west, in the belts of the Trade Winds they flow from the east.

North and south of the equator are the two equatorial currents. Notice that they are both piling up water on the western side of the oceans, hence there is an equatorial counter-current between them which brings part of the water back. Note which are the cold and which the warm currents.

The swirl of the waters is in the same direction as the winds in an anti-cyclone. In the centre is an area of stagnant water often full of drifted seaweed (*Sargassum*) and often called the Sargasso Sea, though the true Sargasso Sea is the one in the North Atlantic.

**Currents of the Atlantic Ocean.**—In Fig. 49 is shown the general arrangement of currents for all the oceans. Naturally their arrangement in each varies according to the shape of the land.

The cold waters from the Antarctic move under the influence of the westerly wind towards the east as the Antarctic or West Wind Drift; turn northwards along the shores of Africa as the cold Benguela Current and then turn westwards under the influence of the S.E. Trade Winds as the South Equatorial Current. This current divides near Cape St. Roque into a southern branch—the Brazil Current—but the main stream flows north-westwards just into the Gulf of Mexico. It emerges from the gulf as the famous Gulf Stream and is joined by the North Equatorial Current. At first the Gulf Stream is a rapid current of dark blue warm water. The average speed is three miles an hour or five miles in the coldest and warmest seasons. This is about equal to the speed

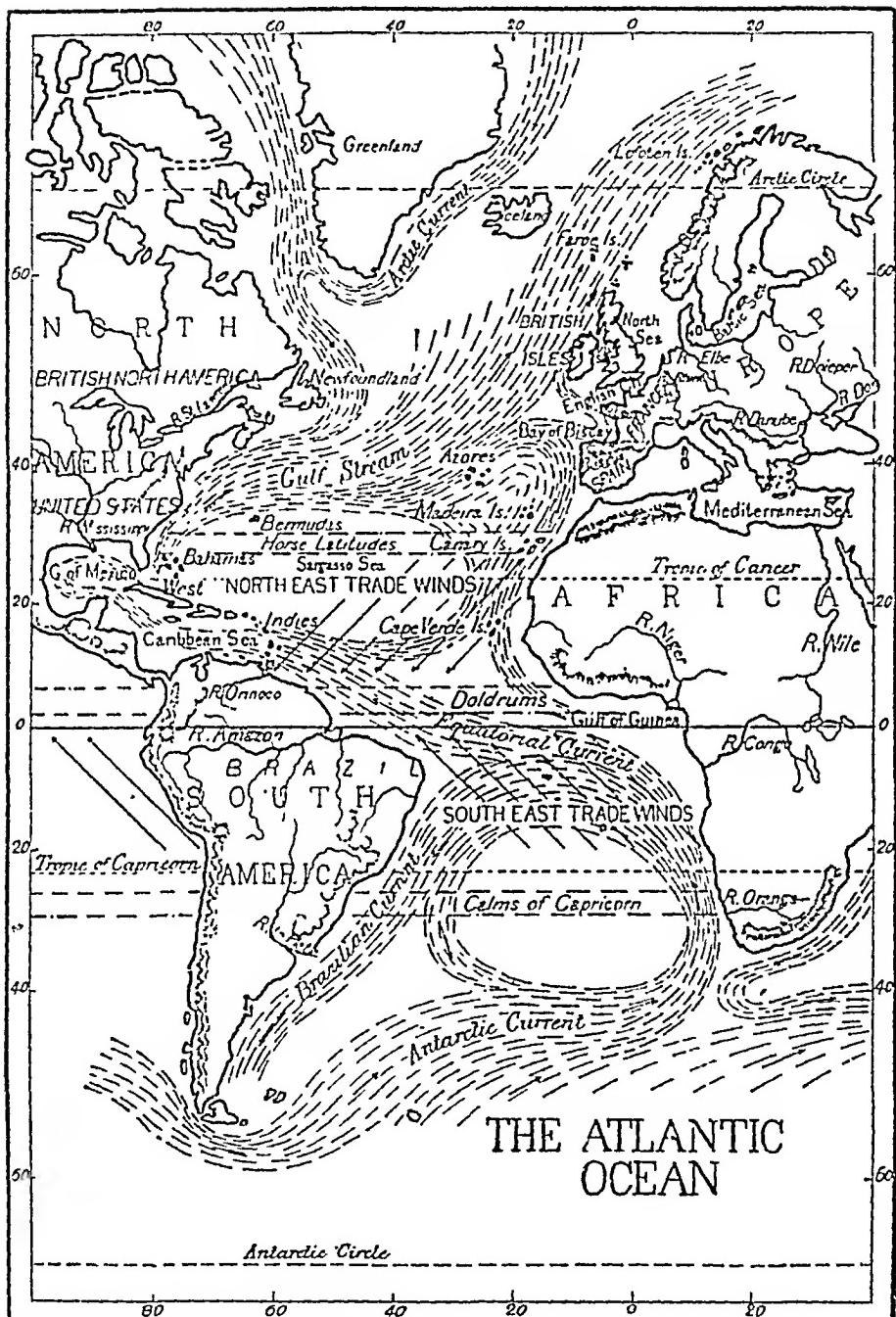


FIG. 50.—Currents of the Atlantic Ocean.  
(From Longmans' "Geographical Series," Book V.)



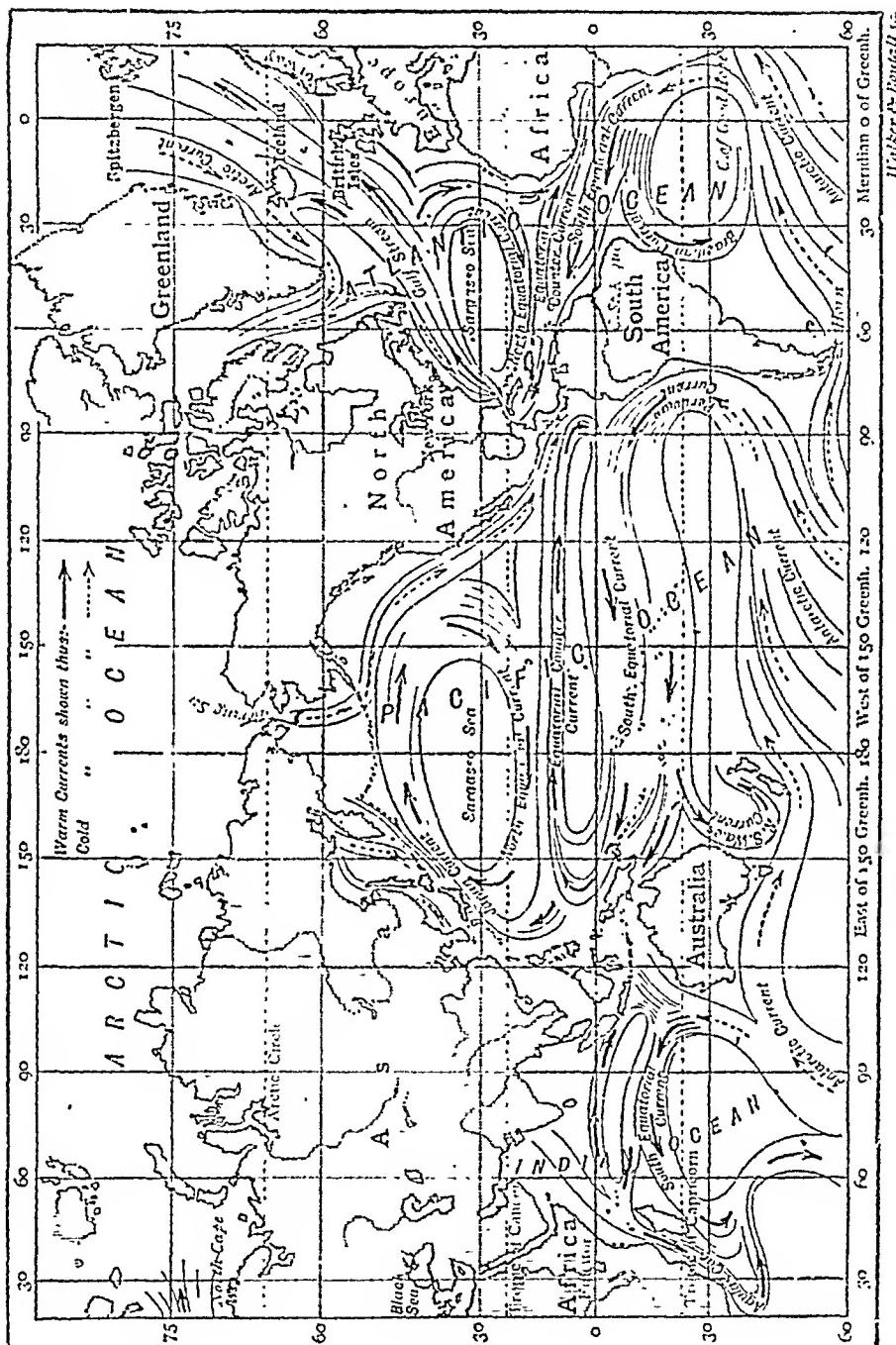


FIG. 61.—Currents of the Pacific Ocean.  
*(From Lommens' "Geographical Series" Book V.)*

**Currents of the Indian Ocean.** (a) *South Indian Ocean*.—In the southern part of the Indian Ocean the currents are similar to those in the southern parts of the Atlantic and Pacific Oceans.

There is the same Antarctic Current, which swings northwards along the coast of Western Australia as the

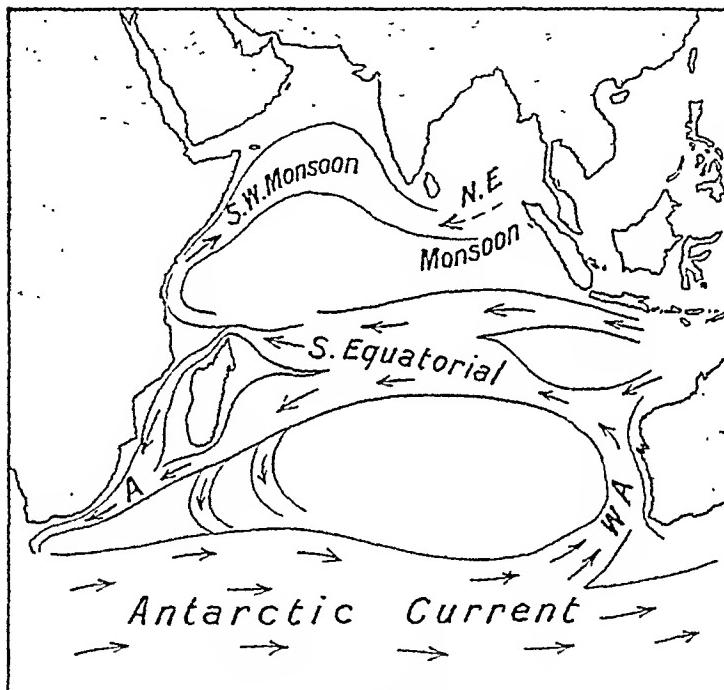


FIG. 52.—Currents of the Indian Ocean.

West Australian Current (W.A.) and passes into the South Equatorial. Like the South Equatorial Currents of the other oceans this divides, but the southern branch is split into two by the island of Madagascar. The most important branch flows between the island and the main land as the Agulhas Current (A.).

(b) *North Indian Ocean*.—The currents in the northern

part of the Indian Ocean depend on the monsoon. When the S.W. Monsoon is blowing the drift of the water is from the south-west. At this time of the year—in our rainy season—the northern branch of the South Equatorial Current flows along the north-east of Africa as the Somali Current and then drifts across the ocean as the S.W. Monsoon Drift. When the N.E. Monsoon is blowing the water flows from the north-east and forms the N.E. Monsoon Drift, which is really the North Equatorial Current of the other oceans. At this season a counter-current flows eastwards between the two equatorial currents.

**Currents of Inland Seas.**—In some seas, especially the Baltic and Black Seas, the amount of fresh water received from rivers is greater than the loss due to evaporation. Consequently there are outward-flowing currents of comparatively fresh water. Notice from your maps the straits through which these currents flow.

Other seas, especially the Red Sea and Mediterranean Sea, receive only a little fresh water from rivers and the loss by evaporation is very great. The Red Sea is one of the hottest seas in the world, and has no important river flowing into it. Consequently there are strong currents flowing in from the open ocean to replace the losses.

Strong local currents are caused by tides. We shall learn about these later.

Vertical currents are caused mainly by the uprise of water to replace losses due to evaporation. There is thus a constant "welling up" of water in the equatorial regions.

In some seas which are cut off from the ocean by a ridge and in which there is little evaporation, the bottom waters are stagnant—that is, they do not move. This is the case in the Black Sea. This prevents air or dissolved gases circulating, and so animals are prevented from living in such stagnant waters.

**Effect of Currents on Climate.**—The air over a warm current is kept warm, and the air over a cold current is cold. Consequently lands which are under the influence

human food. They are nearly all found in shallow water near the land.

The coral builders are important because they build up coral reefs and islands in tropical waters.

The coral builders, molluscs, and many of the plankton build up their hard parts—that is, their houses or their shells—of calcium carbonate which they obtain from the water. When the animals die the hard parts remain and collect together on the bottom of the ocean, and so form different deposits on the ocean floor.

### MARINE DEPOSITS

Covering the floor of the seas and oceans there is a thick coat of *marine deposits* which is continually being added to. Near the shore are sands, gravels, and muds formed by the wearing away of the land, and among the sand and mud are buried the hard shells of molluscs and the bones of fishes. In deeper water we find red, blue, and green muds, or sometimes coral mud formed of tiny broken fragments of coral. In the deep parts of the oceans far from land the deposits are formed entirely of the minute cells of the plankton. Such deposits are called *oozes*. There are different kinds of oozes according to the different plankton of whose shells they are formed. Two of the most important are the white Globigerina ooze and darker radiolarian ooze. In the very deepest parts of the ocean we find a *Red Clay*.

### LAKES

Lakes are areas of water surrounded by land. Usually they have a river flowing in at one end and flowing out at the other, and such lakes are fresh—that is, their water is free of salt. Sometimes, however, there is no outward-flowing river, but evaporation prevents the lake from growing smaller. When water evaporates, any salts it has in solution are left behind. So we find lakes of this sort are usually

salt. Some of them, like the Dead Sea, are much saltier than the ocean, and may be so salt that animals cannot live in them. Some lakes in desert regions, like the centre of Australia and the dry parts of South Africa, dry up in the dry season and completely disappear or leave only a small marshy area. Many lakes are much bigger in the rainy season than in the dry season, like Inle Lake in Burma.

## D. THE LITHOSPHERE

THE Lithosphere is the name which we give to the solid crust of the earth. The materials of which it is composed are called *rocks*, whether they be hard or soft. Geology is the name of the science which deals with the crust of the earth, but it is necessary for us in geography to know something. You have learnt that the hydrosphere is the mantle of water which girdles the earth, but the lithosphere projects through it and forms the continents. It is almost impossible to study that part of the lithosphere which is hidden below the ocean; we can only study that part which forms the dry land.

### CHANGES IN THE EARTH'S CRUST

It is most important to realise that changes are continually taking place on the surface of the earth. The changes which are going on continually but gradually are of three main kinds :

- (a) The wearing away of the land, which we call *denudation*. The wearing away which takes place in the air is called *weathering*.
- (b) The removal of material from one part of the earth's crust to another, which we call *transportation*.
- (c) The laying down of this material in fresh places, which we call *deposition*.

There are also more sudden or discontinuous changes such as earthquakes, volcanic eruptions, etc.

### DENUDATION

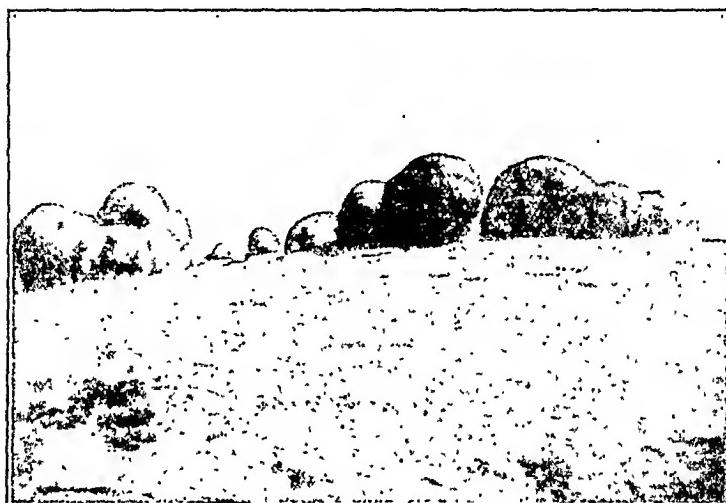
As soon as dry land appears above the surface of the ocean, there are forces waiting to wear it away. You all know what happens during the rainy season. The rain beats down on the ground and removes loose particles of soil, so that at the end of the rains we often see tiny valleys have been cut at the sides of the roads. You have probably all seen the great rivers such as the Irrawaddy, Ganges, Brahmaputra, or Indus, and you know that the water is usually very muddy. That mud has been brought by the river from far away and is being carried out to sea, where it will all be deposited. We must consider now the agents which wear away the land. They are (1) the sun, (2) wind, (3) rain, (4) frost, (5) running water, (6) moving ice, and (7) the sea.

**Action of the Sun.**—In hot countries the heat of the sun is very great during the day, and the rocks on the surface are made very hot. You know that when most things are made hot they expand or grow larger, but some substances expand more than others. The rocks of the earth's crust consist of different substances called *minerals*, and the minerals expand at different rates. One mineral expanding more quickly than the others causes the rock to burst and cracks are formed. Then at night time the rocks get very cold and contract. When this process is repeated day after day the cracks increase in size and gradually the rock breaks up into small pieces. This action of the sun is called *insolation*, and is important in *hot* dry countries.

**Wind.**—The wind acts in two ways. Strong wind blows loose particles of soil and dust away. The wind is often strong enough to blow quite coarse sand from the seashore for long distances inland. In some countries the wind blows all the soil away so that no plants can grow. There is another way, too, in which wind wears away the land. Strong wind armed with millions of sharp pieces

of sand blows against a cliff or mass of hard rock, it gradually polishes the surface and then commences to eat away the hard rock. The action is strongest near the ground, so that a rock is "undercut" and eventually it falls over. The action of the wind is especially important in dry countries and near seashores.

**Rain.**—The rain, especially in hot countries like parts of India where there is a very heavy rainfall, has a powerful



*[Photo : L. D. Stamp.]*

FIG. 54.—The weathering of granite, largely due to the action of the sun, Matopos Hills, Southern Rhodesia.

action in loosening and carrying away the soil. When the soil is bound together by the roots of trees or grasses this is more difficult, but when the trees are cut down and the hillsides are cultivated, large areas are often completely washed away by a heavy fall of rain. When heavy rain falls on soft beds of sand or clay in which there are big stones, the soft material all round the stone is washed away, but the soft rock which is below the big stone is protected and so stands up as an earth pillar. Fig. 55 is a picture

of an earth pillar from the dry part of Burma. Rain, too, in passing through the air, absorbs a considerable proportion of carbon dioxide gas. Rain-water with this gas in solution is able to dissolve certain hard rocks such as



[Photo : L. D. Stamp.

FIG. 55.—An earth pillar in the dry belt of Burma.

The rain has washed away the soft sand and pebbles, except where they are protected by a mass of hard sandstone.

limestone. Much of the rain-water sinks into the ground and carries on its work of solution there, forming underground caves. There are a few substances, too, which, like salt, are dissolved by pure water.

**Frost.**—The action of frost is important in cold

countries. When the rain falls part of it sinks into the ground and fills up the cracks in the rocks. At night, when it becomes very cold, the water in the crack freezes. You know that when water is changed into ice it expands. The force of the water in the crack expanding when it is changed into ice causes the crack to widen. This goes on night after night till the crack becomes very wide, and one day when the ice melts a lump of rock breaks off. The blocks and stones thus produced by frost action are angular and sharp-edged. Frost is one of the most powerful agents in cutting away the tops of high mountains. It causes them to be very rugged and sharp-edged. The angular blocks fall to the foot of the mountain and form heaps called seracs.

**Running Water.**—When rain falls on to the ground some of it sinks in, but a great part of it collects together to form little streams, which in their turn join up to form rivers. The streams cut for themselves little valleys, which at first tend to be deep and narrow. The rain helps to wash away the banks, so that the valley becomes broader and broader with age. The force of the water itself is sufficient to do a great deal of damage, especially after a heavy storm when the stream is in flood, but it is enormously increased by the load of stones and sand which the water collects. Big pieces of rock are hurled against one another and gradually worn into rounded pebbles and sand. The stones, too, are thrown against the hard rocks in the bed and on either side of the stream, and as a result the stream is able to cut its valley even through solid masses of hard rock. Denudation by rivers and moving water takes place in all parts of the world except the very coldest. The denuding action of a river is greatest in its upper course, where the water is flowing down steep slopes. Big slow rivers have little power to wear away the land. Rivers, like rain-water, may dissolve certain rocks such as limestone as well as wear them away mechanically.

**Moving Ice.**—In very cold countries and in high mountainous districts where it is equally cold, instead of

rivers we find solid masses of ice. These "rivers of ice" are called glaciers. Like rivers, they occupy valleys. Compared with rivers, glaciers move only very slowly, but they do move. Fresh snow is falling on the mountains behind them, and by its weight helps to push the glacier down its sloping valley. The snow itself is compressed as "névé" or "firu," and then gradually into ice and is added to the glacier. The mass of ice moving downwards gradually scoops out its valley. Blocks cut off the surrounding mountains by frost fall on the surface of the glacier. Great cracks called crevasses form in the mass of ice, and into these cracks some blocks fall and are frozen into the bottom of the glacier. There they come in contact with the hard rocks of the valley floor, and the two scratch

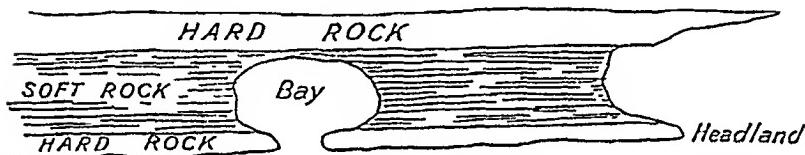


FIG. 56.—Map of a sea-shore with headlands of hard rock.

one another. We must notice that a glacier is able to scoop out its floor, so that one part of its valley is deeper than another. A river cannot do this. The result is that when the glacier melts a small lake may be left.

**The Sea.**—The sea is a powerful agent in wearing away the land, especially in time of storm. Each wave hurls a great mass of water against the shore and washes away the soft parts; usually, too, the waves are armed with small stones and sand which are hurled together with the water against the shore and do still more damage. Naturally, the sea cuts away the soft rocks more rapidly than the hard. The harder parts are left as headlands, capes, and islands. Not only does the sea break away large pieces of rock from the coast, but it pounds the pieces against one another till they are worn into pebbles and sand. The action of the sea does not extend to a great depth, and the area of land

which has been worn away is marked roughly by the extent of the *continental shelf*. We must notice that the other agents of denudation cut the surface into hills and valleys, but the sea wears them away until a nearly *flat* surface is formed.

### TRANSPORTATION

Some of the same agents which are capable of wearing away the land are also able to carry the material from one place to another.

**Wind.**—The wind blows fine dust for great distances. The interior of China is covered by a thick mantle of fine dust (called loess), which has been blown to its present position by the wind. Wind also blows sand from the sea-shore for great distances inland.

**Running Water.**—Rivers are the most important of all transporters of material. Some of them are many thousands of miles long, and so carry mud and sand for enormous distances. Rivers carry material in two ways :

- (a) In suspension, that is, suspended in the water itself. You know that if you dip some water out of one of the Indian rivers, like the Ganges or Irrawaddy, it is very muddy. If you leave it for some time without moving it, the mud will settle to the bottom. Fine particles carried in this way are said to be carried in suspension. Mud and sand are carried in this way.
- (b) Along the bed of the river, quite large stones can be moved great distances by being rolled along the bed, but as they are rolled along they are knocked against one another and gradually made smaller.

**Moving Ice.**—Glaciers also carry material in two ways. We have mud, stones, and big boulders frozen into the bottom of the glacier, and of which the side which scrapes along the bottom will be covered with long scratches. We have also the big and small blocks called moraines, which

fall on to the surface of a glacier and are carried along. At first most of them are carried on the sides of the top, where they form *lateral moraines*, but if two glaciers join the two lateral moraines unite to form a central or *median moraine*. In cold countries the glaciers descend right to the sea-level, and the foot of the glacier is pushed out into the sea. Great masses of ice are broken off and float away as icebergs, carrying their load of moraines with them. We should notice that icebergs originating in Antarctic seas are large, blue in colour, and flat-topped ; those from Arctic waters are more irregular.

**The Sea.**—The sea carries material in two directions. It rolls pebbles and sand laterally along the coast. It also gradually moves the material which it has broken away from the coast into deeper and deeper water. Much of the material brought down by rivers is washed farther away when it reaches the sea.

#### DEPOSITION

There comes a time when all the material which has been worn away from one part of the earth and carried to another is laid down again or deposited.

**Wind Deposits.**—The lands in dry countries—such as parts of China and the interior of Asia—are often covered by a thick mantle of wind-borne dust called loess. The sand blown from seashores and in deserts is deposited as crescent-shaped sand-dunes.

**River Deposits.**—Where a swiftly flowing mountain stream suddenly enters a flat area it often drops a great heap of mud and stones, forming an *alluvial fan*. Where a river enters on a flatter portion of its valley and the current becomes slower the river drops much of the sand it is carrying and so forms sandbanks. Much more important are the deposits formed where the river enters the sea. Here even the fine mud is dropped, and the salt in the sea-water has the effect of making the river drop nearly all

its load. The deposits formed at the mouth of a river form a broad flat area, intersected with channels of the river itself and called a delta. Look in your Atlases for maps showing the deltas of the Ganges, Nile, Amazon, Mississippi, and other big rivers. The mud which is dropped by a river is called alluvium. More and more alluvium is deposited until the channel of the river is entirely filled up, and the water has to find a new channel in another direction. Thus the channels in a delta are continually changing. The stretches of alluvium then form land, and indeed some of the most fertile land in the world has been formed in this way. Examples are the great delta of the Irrawaddy, famous for its rice, and the great delta of the Ganges.

Many rivers, too, overflow their banks every year and deposit a thin layer of the fertile mud or alluvium over the flat floor of their valley. A good example is the valley of the river Nile in Egypt, which has been made fertile in this way. The area flooded in this way is called the floodplain.

Notice the enormous areas covered by the deltas of many rivers. This shows you the great amount of mud which is brought down by rivers.

Some rivers do not form deltas at their mouths, because the mud is swept away by the currents of the sea or by tides.

**Lake Deposits.**—When a river enters a lake, mud and sand are dropped until gradually the lake is filled up.

**Glacial Deposits.**—When a glacier from the mountains descends to lower levels where the air is warmer, the ice melts and the moraines are deposited. At the melting end of a glacier we find an irregular mass of mud, small stones, and big boulders, which we call *terminal moraine*. Sometimes when a glacier melts some of the lateral moraine is left perched on the sides of the valley in curious positions. We call such blocks "perched blocks." The moraines carried by icebergs are eventually dropped on the floor of the ocean. There are certain places where the

cold currents bearing the icebergs come in contact with a warm current and the icebergs quickly melt, so that great quantities of moraine are dropped. Such a place is found off the coast of Newfoundland and called the "Great Banks."

Thousands of years ago part of the earth was much colder than it is at present, and great sheets of ice and glaciers covered countries like England and North Germany where now there is no ice. These ice-sheets when they melted left behind a thick mass of clay full of big stones. We call this "Boulder Clay."

**Sea Deposits or Marine Deposits.**—You have already learnt something about the deposits which are formed in the sea. Near the shore we find coarse deposits of sand and pebbles (littoral deposits); in deeper water we find mainly mud.

**Organic Deposits.**—Besides mud, sand, and stones which are dropped on the floor of seas, lakes, and rivers, we find deposits which are formed of the remains of animals and plants. In some parts of the world forests are found growing in very wet flat land, and when the trees die they fall into the stagnant shallow water and other trees grow up on top of the dead ones. In time the remains of the trees are converted into a rock called peat, and after long ages into coal. Peat is thus an organic deposit formed from the remains of plants. Peat may also be formed not from trees but from small plants called mosses. Peat mosses are common in Siberia, Ireland, and many other temperate countries. Organic deposits may also be formed from the remains of animals living in the ocean, as we have already learnt.

#### THE WORK OF RIVERS

From what you have already learnt you will see that the work of rivers falls into three divisions :

- (1) In the swift upper course the main work is denudation or wearing away.

- (2) In the slower middle course the main work is transportation.
- (3) In the slow lower course and delta the main work is deposition.

We must now consider some of the characters of river valleys. When the valley is first formed it is often deep and narrow, but with time the sides are worn away by the action of rain, side streams or tributaries, and the action of the river itself, so that gradually the valley becomes broad and open as shown in Fig. 57. In countries where



FIG. 57.—Section through young valleys (A) and an old valley (B).

there is little rain the valley may remain very narrow and deep, as in the famous Canyon of Colorado. In the steep upper course the water finds its way by the easiest or nearest way to the lower land, but in the middle part of its course the river swings from side to side across its valley floor. River valleys are rarely straight, and if we look up a valley we notice that hills stick out from either side, so that we cannot follow the river itself for far with our eyes. Such a valley with small hills jutting out on either side is called a "valley with interlocking spurs." The small hills or spurs appear to interlock because they are first on one side and then on the other. As time goes on the river cuts away the spurs on either side, and we find a broad open valley with the river wandering about from side to side. The bends of the river are called meanders.

Sometimes a bend in the form of a horseshoe is formed, and then the river cuts a new channel. The old channel

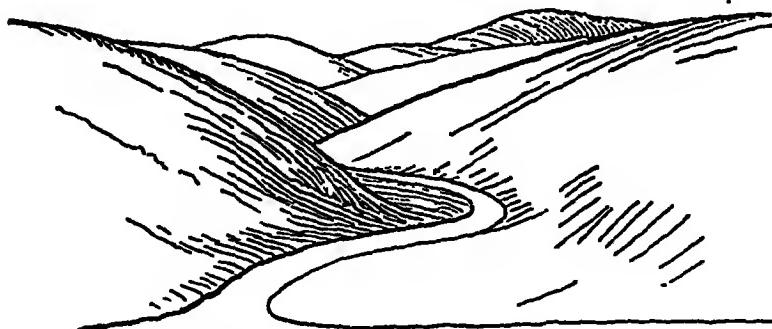
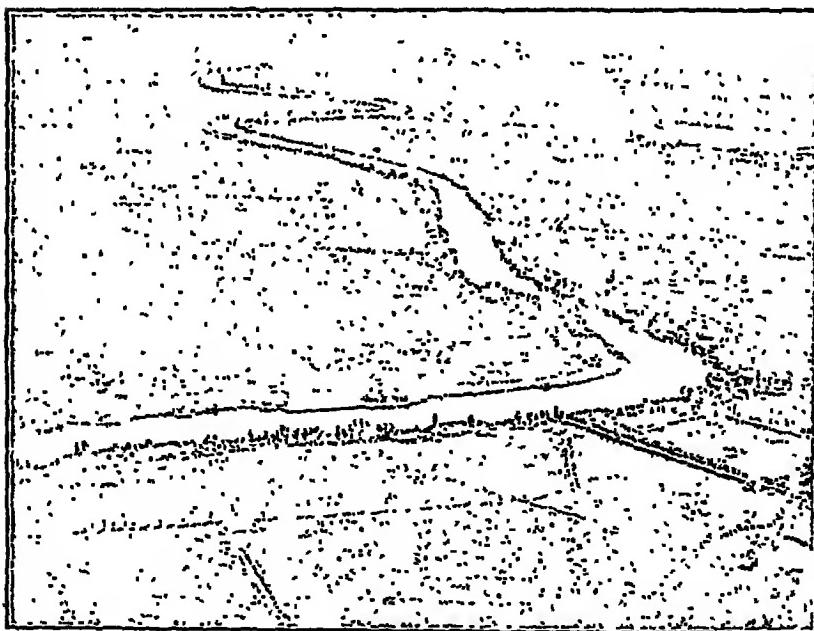


FIG. 58.—Diagram of a valley with interlocking spurs.

may be left as an area of stagnant water or a lake. Rivers which flow over broad alluvial plains, like the Ganges, are



[Photo : Central Aerophoto Co., Ltd.]

FIG. 59.—A river meandering across a peneplain.

continually changing their course. Rivers like this, too, deposit sandbanks in one place and cut a deep channel in another place. Notice from Fig. 60 how they do this.

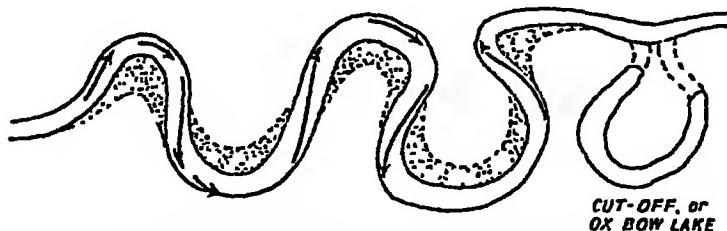


FIG. 60.—Diagram of a meandering river with sandbanks.

In the next flood season, during the rains, the river cuts away the sandbanks it formed the year before and makes a new channel. The Irrawaddy does this, and none of the maps which were made a few years ago are correct now. You will learn later that there are both hard and soft rocks. A river is able to cut away soft rocks more easily

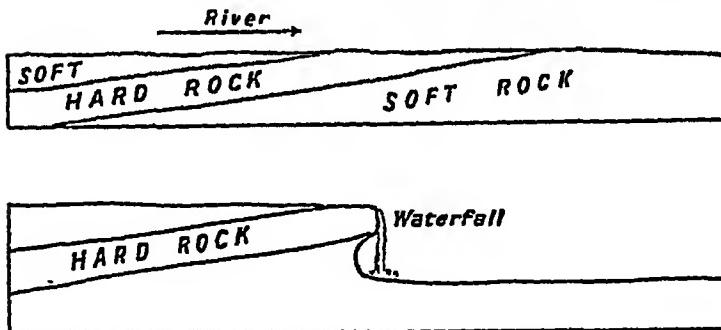


FIG. 61.—Section showing the origin of a waterfall.

than hard, and when a band of hard rock is reached waterfalls and rapids may be formed, as shown in the diagrams.

**River Basin.**—The whole of an area drained by a river and its branches or tributaries is called the river basin. Two basins are separated by the ridge or hills

which form the watershed. The actual line separating two basins is the "water-parting." Some rivers drain into lakes and not into the sea at all, and their basins are called basins of inland drainage.

#### THE WORK OF GLACIERS

Glaciers have a threefold work like rivers, but ice does not swing from side to side like water, and so glacial valleys

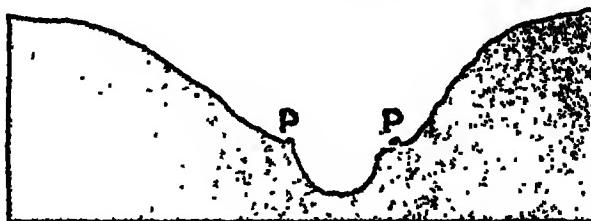


FIG. 62.—Section through a glacial valley. P=position in which perched blocks are left.

are straight and without spurs. We must note that the valley occupied by a glacier is U-shaped, that occupied by a river V-shaped.

#### UNDERGROUND WATER

Some of the rain which falls upon the ground sinks into the rocks beneath. The amount which sinks in depends upon the nature of the rock. Some rocks allow water to

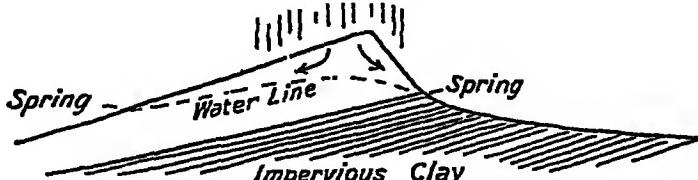


FIG. 63.—Diagram showing the origin of springs

pass through them very easily—they are full of small cracks or holes—and are called permeable. Other rocks like clay will not allow water to pass through them, and

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are called impermeable or impervious. You know that you can make a cup or chatty of clay and it will hold water. See what happens when the rain-water sinks underground and meets an impermeable rock. It will then travel along the surface of the latter and find its way out on a hill-side as a spring. Such a spring often forms the source of a river. See what happens when the rocks are bent into a hollow curve, or a "syncline." The water is trapped in the

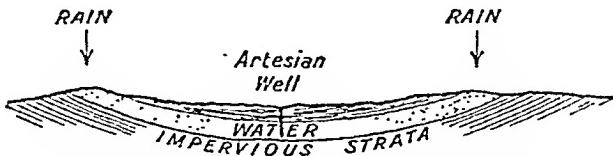


FIG. 64.—Section showing an artesian basin.

centre, and by putting a well in the centre we get a good supply of water. Such a well is called an artesian well.

In limestone countries the underground water is able to dissolve some of the limestone, and so caves are formed. Limestone caves are also remarkable for stalactites and stalagmites. As the water trickles through the roof some of it evaporates and a little of the limestone it has dissolved is deposited, and in time masses hanging from the roof are formed—these are called stalactites. A similar deposit found on the floor forms the stalagmite.

#### SUDDEN CHANGES IN THE EARTH'S CRUST

Before we can understand the sudden changes—earthquakes and volcanic eruptions—which take place we must go back and learn a little more about the structure of the earth. We learnt that the interior is probably a solid mass of iron. Outside this is the lithosphere. We must remember that we can only see and study the upper part of the lithosphere. We know, however, that as we go down in the earth's crust from the surface—as when we descend a mine—it gradually becomes hotter and hotter.

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At great depths it must become so hot that the rocks if

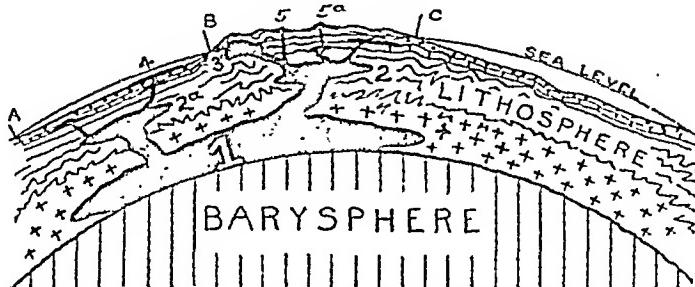
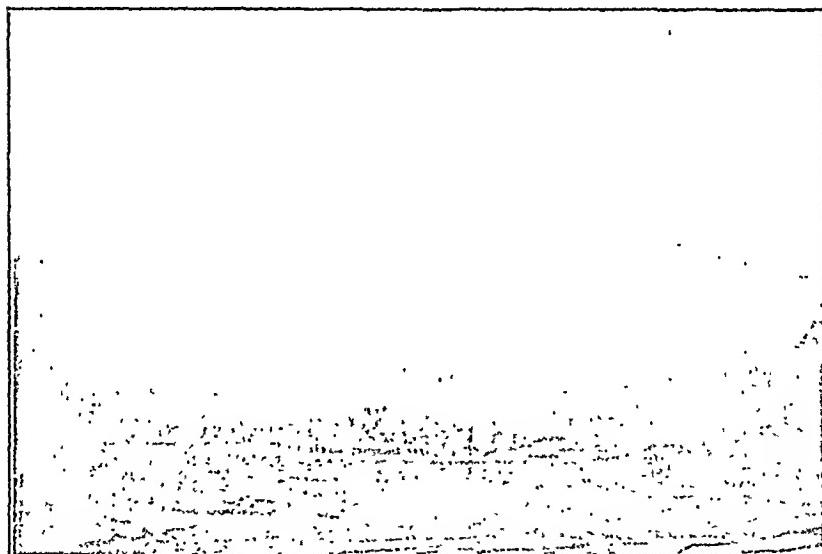


FIG. 65.—Diagrammatic section through the earth's crust.

(From Stamp's "Stratigraphy," Murby & Co.)

1 = a great mass of molten rock deep down in the earth's crust; 2 and 3 = smaller masses of molten rock; 4 = lava poured out under the sea; 5 and 5a = volcanoes.

they could would be molten. For the most part, however, the rocks must be kept solid because of the great pressure.



[Photo: L. D. Stamp.]

FIG. 66.—A typical volcano, Java.

Notice the conical form, with the upper part of the slope steeper than the lower. This volcano is about 8000 feet high and is entirely built up of lavas and ashes. It has not been active for many years.

So we can picture the solid earth's crust on which we stand as a thin shell below which are rocks very, very hot indeed. But the shell is not equally strong all over. As we shall learn later, there are weak places or even cracks. We have just learnt that material is shifted from one part of the crust to another, and the removal may leave one part of the crust weaker than others. When the crust gets weak the pressure is less, and the underground parts become molten and begin to move. The movement of molten rock underground causes the solid crust to shake, and so we have earthquakes. Sometimes the molten rock finds its way to the surface and is poured out as a *volcano*.

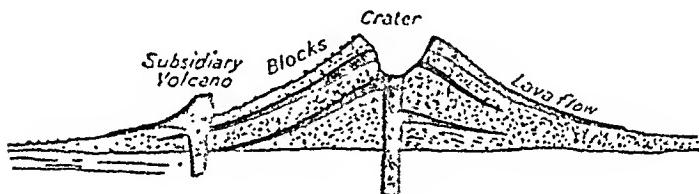


FIG. 67.—Diagrammatic section through a volcano, Mount Popa, Burma.

When the molten rock first bursts through, it often does so with great violence. Great clouds of steam are emitted, and dust and ashes are thrown far into the air. The ashes fall back to earth and build up a mountain near the opening. This mountain is added to by the molten rock or lava which is poured out. The cup-shaped hollow in the centre of a volcano is called the crater; the neck is the passage through which the molten rock comes. The lava may be poured out as several volcanoes, or it may come out along huge cracks. A large part of the Deccan consists of lava which has been poured out through cracks. Volcanoes which are no longer active are called extinct. Mount Popa in Burma is an extinct volcano. A volcano which is only sleeping and may become active is called dormant. Volcanoes are arranged along lines of weakness in the earth's crust. One such line runs right round the

Pacific Ocean ; another rather less important runs from Iceland, just touching the British Isles, through the Azores and Cape Verde Islands, across to the West Indies, with a branch running through the Mediterranean Sea.



[Photo : L. D. Stamp.]

FIG. 68.—Looking down the crater of an active volcano, Mount Bromo, Java. The cloud of steam and gases rises day and night with a loud roaring noise.

Geysers are hot springs which throw up quantities of boiling water into the air at intervals of so many minutes or hours. They are found in Iceland, New Zealand, and the Yellowstone Park, United States.

Earthquakes.—The movement of molten rock deep

down in the earth's crust causes the surface to shake, and we, living on the surface, feel an "earthquake." Some earthquakes are connected with volcanic eruptions, but much more important are the earthquakes which result from the movement of material underground but which we cannot see. Like volcanoes, earthquakes usually occur along weak places in the earth's crust. Some of them are actually connected with cracks in the crust. These cracks are called "faults," and often after an earthquake the rocks on one side of the fault are seen to have moved up and on the other side to have moved down, leaving a small cliff. After the great San Francisco earthquake in 1906 it was impossible to travel along some of the roads, because there was a sudden drop of 6 or 10 feet where the road had been cut by a fault.

**Results of Earthquakes.**—You all remember the great Japanese earthquake of September, 1923. After that terrible disaster, it was found that some parts of the land had moved up so that areas of land appeared which were before covered by the sea, but other places which were formerly dry land sank below the level of the sea. Before the earthquake the sea in the Gulf of Tokio was in places 2500 feet deep; after the earthquake it was only 500 feet, showing that the floor of the sea had risen—the enormous amount of 2000 feet. In 1819 a great earthquake occurred in India, and an enormous tract of land near the Rann of Cutch sank below the level of the sea. In such cases huge waves may be formed and sweep over the land, causing great loss of life.

With a succession of earthquakes the changes produced may be very great indeed. We see that there are three principal results of earthquakes:

- (1) The surface of the earth is folded; some parts move up and others move down, producing arches and hollows. The arches are called "anticlines" and the hollows "synclines."
- (2) Along cracks or faults the rocks are moved up on one side and down on the other.

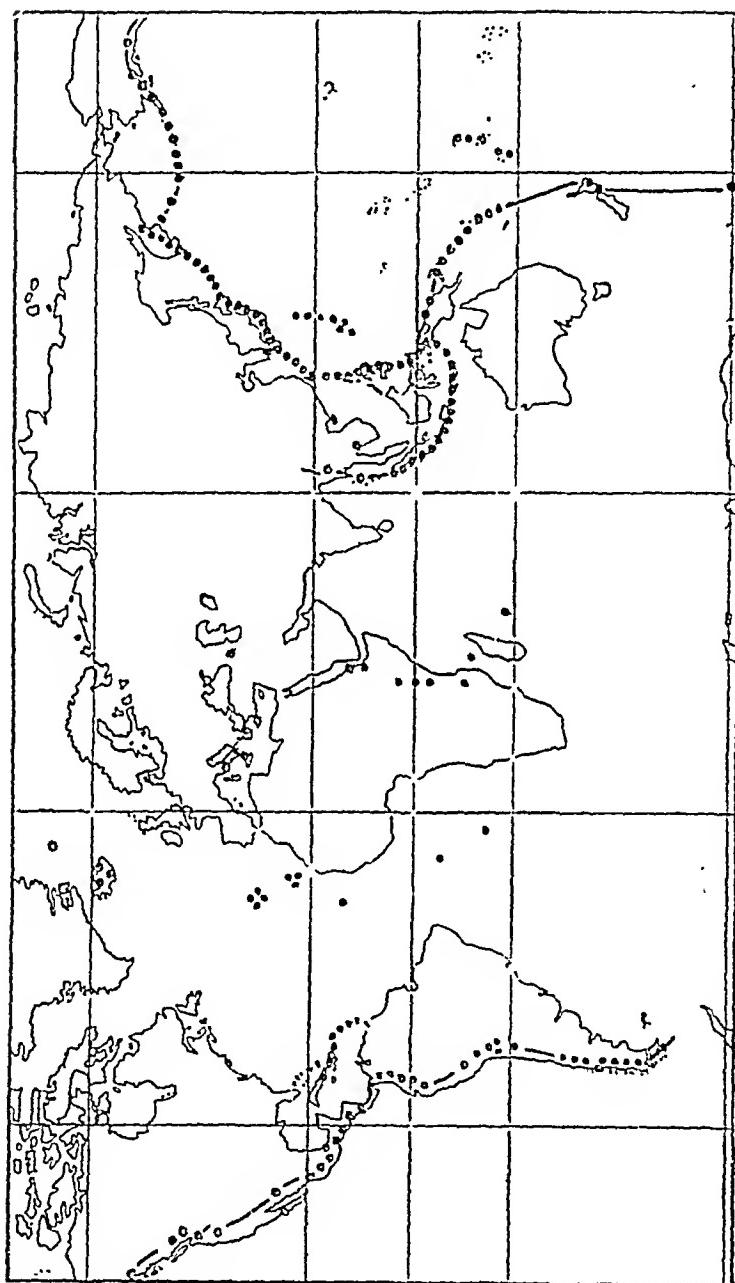


FIG. 69.—Map of the world, showing the distribution of volcanoes (marked by dots).

- (3) Large areas may be lifted up above sea-level so that they become dry land; other areas of dry land become covered by the sea.

### MOUNTAIN BUILDING

The two most important kinds of mountains are fold mountains and block mountains. Both kinds are produced by a long series of earthquakes. Let us see how.

**Fold Mountains.**—As a result of one earthquake a level stretch of the earth is gently folded like this :

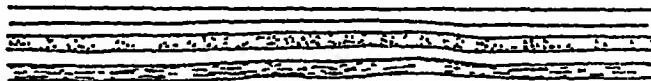


FIG. 70.

The next earthquake may make the folds much greater so that they become like this :

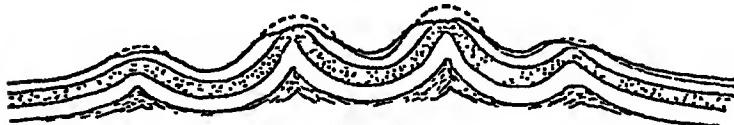


FIG. 71.

Later the rocks are still more folded like this :

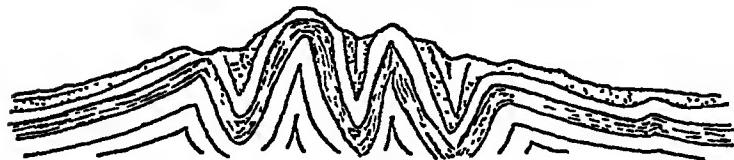


FIG. 72.

One part is ridged up to form mountains often of great height, while the other part is covered by the waters of the ocean. Mountains formed in this way are by far the most important in the world—the Himalayas, Alps,

Andes, Rockies, etc. They usually form long lines or ranges of mountains, such as the great chain which runs along the continent of America from north to south. Of course it takes a long time and a great many earthquakes for such a great mountain chain to grow.

**Block Mountains and Rift Valleys.**—We learnt above about faults or cracks. Sometimes a big mass of land is pushed up between several cracks and so forms a mountain which we call a block mountain.

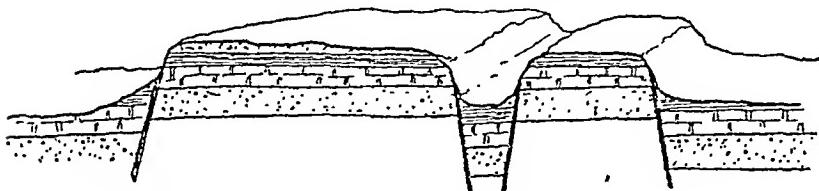


FIG. 73.—Diagram of block mountains and rift valleys.

Sometimes a long narrow piece of the crust is let down between two parallel cracks and forms what is called a rift valley.

**Mountains of Accumulation.**—There are other kinds of mountains besides fold and block mountains. Volcanoes are often called "Mountains of Accumulation," because they are formed by the accumulation of material which is thrown out on to the surface and so gradually built up into hills.

**Mountains of Denudation.**—You have learnt how the agents of denudation gradually wear away the surface of the land. As soon as block mountains or fold mountains are formed, they begin to get worn away. Sometimes only a small piece of the original block mountains may be left, all the rest being worn away. Such a fragment left behind is called a mountain of denudation.

Notice, then, that you can classify mountains into four groups.

**Slow Movements of Elevation and Depression.**—A single earthquake may produce a considerable change,

and several earthquakes may result in great changes although no mountains are formed. We find that in many parts of the world the land is steadily rising or sinking. In many parts of the world beds of sea-shells are found high above sea-level; in other parts the remains of forests are found covered by the sea. This shows that the land is rising in some parts and sinking in others.

**Peneplains and Plateaux.**—We learnt that the sea is the most important agent which wears away a flat surface (the surface of the continental shelf). If part of this surface becomes raised into dry land, it forms a peneplain. The word "peneplain" means "almost a plain." A peneplain may also be formed by rivers. We learnt that when a river becomes old it swings from side to side, and gradually the valley sides are worn away and almost disappear. The ridge between one valley and the next can scarcely be seen, and the whole surface of the land is almost a plain—a peneplain.

The movements of elevation may cause a large area to be raised a considerable area above sea-level. Such a big flat-topped stretch of high land is called a plateau. We must remember that as soon as a stretch of dry land is formed, the sun, rain, frost, running water, and ice commence to wear it away. If the rocks are soft they will be worn away quickly, but if they are hard they are removed but slowly. But eventually the plateau will be worn into a series of mountains and valleys. Only the tops of the mountains remain approximately on a level to remind us that there was once a plateau. Such a region is called a "dissected plateau," and the Deccan of India is an example.

#### THE FORMATION OF LAKES

Lakes may originate in many ways.

(a) A river valley may be blocked by a fall of rock, a lava-flow.

(b) The lower end of a river valley may be raised up

by an earthquake. Many of the lakes in the Alps were formed in this way.

(c) An arm of the sea may be cut off to form a salt lake. The Caspian Sea has been formed in this way.

(d) Sand-dunes thrown up by the sea may "impound" river water coming down from the hills. The shallow lakes or lagoons on the west coast of India and Lake Chilka on the east coast have been formed thus.

(e) Parts of a deserted river-bed may form lakes, e.g. the bils of the Ganges delta. The cut-off or "ox-bow" lakes are very common and represent old meanders or curves of the river which it has deserted.

(f) Small lakes may occupy the craters of extinct volcanoes.

(g) Many lakes occupy hollows scooped out by glaciers or by the great ice-sheets which once covered many parts of the globe. The lakes of Canada and Northern Russia are examples. Sometimes a valley has been blocked by glacial moraine.

## ROCKS

We learnt that the materials making up the crust of the earth are called rocks. We can classify them into four main groups according to the way in which they have been formed.

(a) Sedimentary or Stratified Rocks are those which have been laid down in beds or layers (strata) by wind, running water, or the sea. They are in many ways the most important. Animals or plants may sometimes be buried and their hard parts may remain. When afterwards the sediments are raised by earthquakes into dry land we may find sea-shells, etc., far inland. We call such remains "fossils." We can divide sedimentary rocks into three very rough groups :

(i) Alluvium, which is still being formed by rivers.

(ii) Young soft rocks which have not been subjected to great earthquakes or mountain-building

movements. It is in such rocks that oil is found.

(iii) Old hard rocks which have been bent, folded, and cracked by many earthquakes and often raised into high mountains. Even amongst the soft rocks we usually find hard bands which give rise to waterfalls, etc.

(b) **Organic Rocks** are rocks formed of the remains of animals or plants (organisms). Coal is an organic rock which is formed from the remains of forests which have been submerged and then buried. Mineral oil has also been formed from the remains of animals or plants buried when a river deposited its load of mud in the sea or a lake. The important point for us to remember in geography is that coal and oil are *always* found in sedimentary rocks. If we come to a country where the rocks are *not* sedimentary, it is quite useless to look for coal. Many limestones are organic rocks because they are built up of the hard parts of animals living in the sea which have extracted the calcium bicarbonate from the sea-water and built up their own shells from the calcium carbonate obtained in this way. Coral is an example.

(c) **Igneous Rocks**, which means literally "fiery rocks," are those resulting from the interior heat of the earth. There are two main kinds :

(i) Those which reach the surface in volcanoes and are called *volcanic rocks*. The great areas of rock in the Deccan around Bombay have originated in this way.

(ii) Those which moved underground but became solid before they reached the surface. We should never be able to see these rocks if it were not for denudation, which gradually wears away the rocks above and enables us to see the "deep-seated" or plutonic rocks below. A good example of these rocks is granite. Such rocks are usually hard and resist weathering.

(d) **Metamorphic Rocks**—literally rocks which have

"changed their forms." You have learnt that earthquakes bend and fold the earth's crust and gradually build up great mountains. In the process the rocks are hardened and changed. Other rocks become buried by the fresh layers piled on top of them, and may be altered by the great heat in the lower part of the earth's crust. You know that if you take a piece of clay and bake it, the brick which results is quite different from the clay: this is an excellent example of how heat may alter rocks. Deep in the earth the rocks may be altered far more, and it is almost impossible to tell what the original rock was like. We call such rocks metamorphic or crystalline rocks. It takes a long, long time for rocks to become changed like

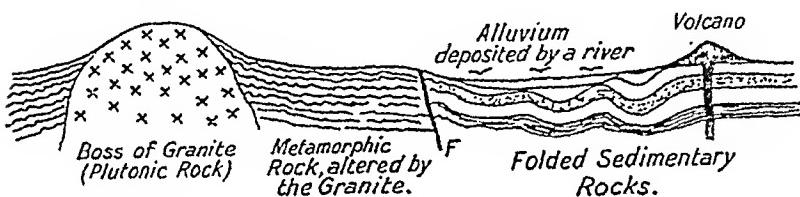


FIG. 74.—Diagrammatic section through part of the earth's crust showing different kinds of rocks.

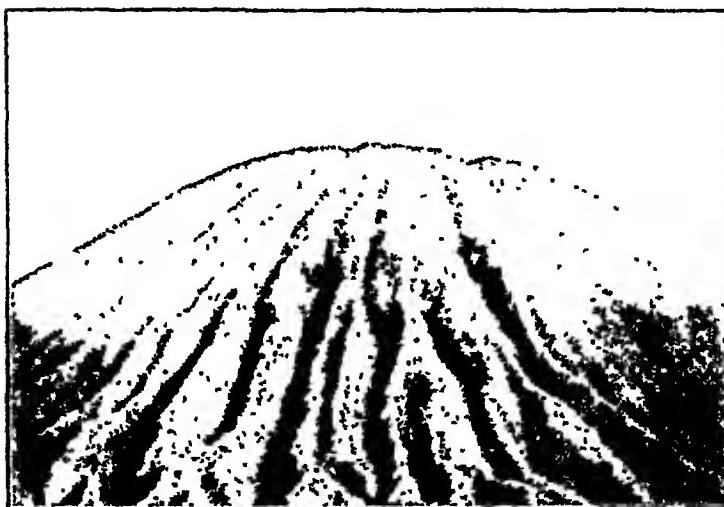
this, and some of the areas of crystalline rocks were formed ages and ages ago and have remained unchanged ever since. The Deccan of India is a good example. Metamorphic rocks, like igneous rocks, are usually hard and so resist weathering.

**Ores and Precious Stones.**—Nearly all the ores of the valuable metals originate like igneous rocks in the hot lower layers of the crust. The ores find their way up to the surface through cracks, in exactly the same way as volcanic rocks. Other ores and precious stones are formed when rocks are metamorphosed or changed. Thus we look for the precious stones and metals such as gold, silver, copper, lead, zinc, and tin in areas of crystalline or igneous rocks, or sometimes among the old hard rocks of the sedimentary group. Some ores are very hard and heavy, and when washed out of the parent rocks by rain and rivers

are often collected together as rich patches in the beds of present streams and rivers. Such deposits are called "alluvial deposits"; tin ore and gold are often found thus.

Notice that we shall always look for metals and precious stones in quite different country from that yielding coal and oil.

**Connection between Relief, Rocks and Mineral Products.**—Areas of lowland will usually consist of



[Photo: L. D. Stamp.]

FIG. 75.—The weathering of soft rocks.

This mountain is an extinct volcano in Java. It is built up of soft ashes and the heavy rains are now cutting deep channels down the side of the mountain.

alluvium or of young soft rocks, and so we shall expect oil and coal to be the principal mineral products of such regions.

Areas of highland or mountains will usually consist of old hard rocks or igneous or metamorphic rocks, and so we shall expect ores, minerals, and precious stones to be the principal products. See how this is true of India and Burma.

## E. GEOGRAPHICAL CONTROL

THE most important thing of all for you to understand in geography is what we usually call "Geographical Control." You must always remember that geography is not just a description of the countries of the world. That is only a small part of geography, and not the part we should learn first. When people began to study their own and other countries they were content at first just to find out facts. But soon they wanted to know "why" and "how" everything should be as it is. They soon found out that there were a few simple *causes* which were to be found all over the world and which control its development.

If you live in one of the big towns of Bengal, such as Dacca or Calcutta, you know that you have to go very many miles before you see a big hill. Most of the country you see around you is flat, and you see paddy-fields everywhere. Yet there are other parts of India—let us say the Cardamom Hills of Travancore—with almost the same climate (same temperature, same rainfall), yet there are very few paddy-fields because there is very little flat land where paddy can be grown. That is an example of the *control of physical features*—where the land is flat there are many paddy-fields, where the country is mountainous there are few. But if you live in Rawalpindi or somewhere in the Punjab you will know that there is plenty of flat land, yet there are few paddy-fields. That is, of course, because it is too dry; the rainfall is not sufficient for growing paddy. Here we have an example of the *control of climate*.

Again, you do not wear nearly as many clothes as people do who live in cold countries. This is again climatic control. But these are not the only cases of geographical control. You can take almost any fact in geography and you will find it has reasons. Many of you live in Bombay. Why has Bombay become such a great city? There is its position, its harbour—here we have the control of physical features again. You will learn later of its valuable “hinterland,” a rich district which sends all its products to Bombay.

Or, again, many of you will be looking forward for March or April or May, for then you know you have your long school holidays. Perhaps you have never thought about it, but that is an example of climatic control. It is very difficult to work well at school during the hot weather, and so the holidays have been fixed for the hottest part of the year. In Burma the hottest months are April and May, so they are holiday months; in the Punjab, where June and July are the hottest months, the holidays are later.

These examples will help you to understand what is meant by “geographical control,” and how important it is. There are really *two* enormously important factors—physical features and climate. In many countries the physical features almost make the climate. You will learn later, for example, how the physical features of Burma control its climate. But the next important thing is for us to learn how the control acts. Firstly, physical features and climate together control the distribution of vegetation. You cannot have paddy-fields on the sides of rugged mountains, and you cannot have forests where there is no rainfall. We shall learn in the next chapter that each type of climate has its own type of vegetation. Then in order the vegetation controls the *animal-life*. You do not find camels in the paddy-fields or jute-fields of the Ganges Valley, and you cannot feed sheep on forest trees. Each type of vegetation has its own characteristic animals. Then we come to man. Man is really controlled by all

these factors—physical features, climate, vegetation, and animal-life. But man can think and work and is able to overcome some of the natural control. But he can only do so after much thought or labour or expense. Where a sea town like Madras has no natural harbour he can build an artificial one; where a country is too dry to grow

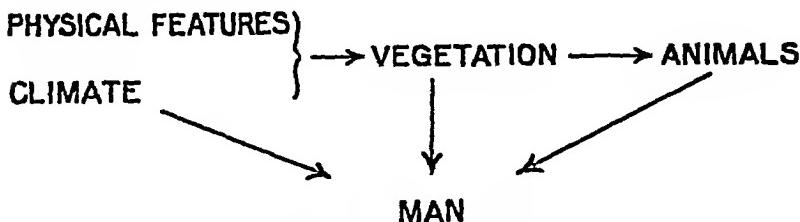


FIG. 76.—Diagram showing geographical control.

The physical features and climate determine the natural vegetation, the natural vegetation determines the types of animals. The activities of man are determined by all these factors, but remember he is able to overcome some of them, at least in part.

crops—like the Indus Valley—he can bring water there and irrigate the land; he can move plants from one part of the world to another, cultivate them, and improve them; he can take animals and domesticate them and train them to do his work.

But although man can thus alter some of the effects of nature, he is, in the main, controlled by his “geographical environment”—that is, by the conditions under which he lives. It is only here and there in little ways that man dares to fight against nature.

We are now going to learn something more about the details of Geographical Control, and shall take first Climate and Climatic Control.

#### THE PRINCIPAL CLIMATES OF THE WORLD

There are only twelve important types of climate in the whole world, and you must study these very carefully and remember the essential features of each. So clear is the connection between vegetation and climate that it is

often simpler to name the climate after its characteristic vegetation.

1. Equatorial or Hot Wet Climate.
2. Tropical or Sudan Type of Climate.
3. Monsoon or Summer Rain Climate.
4. Hot Desert or Sahara Type of Climate.
5. Temperate Desert or Iran Type of Climate.
6. Mediterranean or Winter Rain Climate.
7. Warm Temperate Oceanic or China Type of Climate.
8. Cool Temperate Oceanic or Rain at all seasons Climate.
9. Cool Temperate Continental or Grassland Climate.
10. Cold Temperate Climate.
11. Arctic or Cold Desert Climate.
12. Alpine Climate.

1. **The Equatorial Climate, or Climate of the Hot, Wet Evergreen Forests.**—This type is found as a belt stretching about  $5^{\circ}$  on each side of the equator. The temperature is high all the year round but does not vary very much; an average for the whole year is about  $80^{\circ}$ . Rain falls nearly all the year, so that the air is always hot and moist and the climate as a whole unhealthy. The rains are convectional rains. Owing to the great heat there is much evaporation. The water vapour rises to the upper part of the atmosphere and is cooled, and so falls as rain. Very often evaporation takes place during the morning and the rain falls in the afternoon, accompanied by thunderstorms. Though rain falls throughout the year there are often two seasons rainier than the rest of the year. The Amazon and Congo basins are typical areas having this climate. Islands near the equator—the East and West Indies—have a similar climate. The extreme southern portion of Burma and the Andaman Islands and part of Ceylon have a climate which is very nearly of this type but not quite.

2. **The Tropical Climate, or Climate of the Savana or Tropical Grassland.**—This climate is found on either side of the equatorial belt, and is well developed in Africa.

As usual, "rain follows the sun," and so the heaviest rainfall occurs soon after the sun has been shining vertically, whilst the dry season occurs in the colder part of the year. This type of climate is found in the Sudan (Africa), and so is often called the Sudan type.

3. The Monsoon Climate.—The Monsoon Climate is very similar to the Tropical Climate, but the rainfall is caused in a different way. There is no need to describe to you a monsoon climate, because it is the climate we have in India. There is the cool season with little rain, lasting in India from November to about January; then the temperature begins to get higher, and we have then the hot season from March to May or June. The rains break in June and last till October. Nearly all rain falls in the latter period. If these are the seasons in India *in the Northern Hemisphere*, how would they be different in the Southern Hemisphere? Another name for the Monsoon Climate is the Summer Rains Climate, for the rain falls in the summer of the year. The summer would otherwise be very hot indeed, but the rains make it cooler. The Monsoon Climate occurs around the Indian Ocean, especially in India, Burma, and North-Western Australia. There are small regions in North-Western South America which have a monsoon rainfall.

4-5. The Climates of the Great Deserts.—Passing from the region of the Tropical or Monsoon Climates towards the poles we find regions which are very hot and dry—so dry that scarcely any plants can grow. These regions lie mainly in the high-pressure belts just outside the tropics. The Trade Winds blow away from them towards the equator, the Anti-Trade Winds blow away from them towards the poles, and there are no winds which bring rain into the regions. Some of the regions are dry, too, because, like the centre of Asia, they are very, very far from the sea. There is very little rain and no clouds, so that the sun's rays strike down fiercely on to the ground and make the days very hot indeed. The highest temperatures in the world are found in these

regions. But at night the ground loses its heat very quickly, and so the nights are cool. We may divide these deserts into two groups :

(a) The Hot Deserts, occupying lowlands along the Tropics of Cancer and Capricorn. Examples are the Sahara Desert, the Desert of Arabia, and the Great Indian Desert. In the Southern Hemisphere there are deserts in Australia, South Africa (Kalahari), and South America (Atacama).

(b) The Temperate Deserts, usually found on plateaus outside the tropics. They are much colder in the cold season, and may be covered with snow. Examples are the desert of Iran or Persia, the deserts of Gobi or Shamo, and Colorado in North America.

6. Mediterranean Climate.—As the sun moves north and south of the equator during the year, so the main wind belts of the world swing with it. There are parts of the earth between latitudes  $30^{\circ}$  and  $45^{\circ}$  which in summer are in the northern part of the Trade Wind Belt, and so are hot and dry like the deserts which join them on the side nearer the equator. In winter, however, these regions come under the belt of westerly winds, and so enjoy moist mild winters. In other words, this is the Winter Rain Climate. Contrast it with the Monsoon or Summer Rain Climate, but remember that the Monsoon Climate is on the whole a much hotter one. The Mediterranean Climate is so called because it is found all round the Mediterranean Sea, but it is also found on the western sides of the other continents—North and South America, Africa, and Australia.

7. Warm Temperate Oceanic Climate.—The Mediterranean Climate is found in regions on the western sides of the continents, but on the eastern sides, just outside the Tropics, there are sometimes regions having a warm moist summer and a cool, sometimes dry winter. You will see this is very like the Monsoon Climate, but the temperature throughout the year is less as the regions lie outside the tropics. China and Eastern Australia are

examples, and so this is sometimes called the China type of climate.

8. Cool Temperate Oceanic Climate.—You learnt that the Mediterranean regions feel the effect of the rain-bearing westerly (Anti-trade) winds during the winter. We come next to those regions which are in the westerly wind belt during the whole year. They have rain all the year round, but compared with rain in tropical regions, it is much less. The winters are mild, and the summers cool. This is the climate of North-Western Europe (including the British Isles), Western Canada, Southern Chili, Tasmania, and New Zealand.

9. Temperate Continental or Temperate Grass-land Climate.—Regions having this climate lie mostly in the same belts as the last—in the westerly wind region—but they are far from the ocean and do not feel the moderating effects of its presence. Consequently the summers are very hot and the winters are very cold—a typical “Continental Climate.” Rain falls mostly in spring and early summer, but it is not heavy. It comes mainly as light showers. In winter a little snow may fall. You will learn later of the great and very important grassland regions of the world where this climate occurs—the prairies of Central Canada, the steppes of South Russia and South Siberia, the downlands of Australia, and the pampas of South America.

10. Cold Temperate Climate, or Climate of the Coniferous Forests.—The Cool Temperate Oceanic Climate passes gradually into a colder climate where much of the moisture falls as snow and not as rain. This is the region of the coniferous forests, and occurs as a great belt across North America, Northern Europe, and Northern Asia.

11. Arctic or Cold Desert Climate.—Here the winters are very long and very cold, and there is only a very short sharp summer. This climate occurs in the frigid zones—inside the Arctic and Antarctic circles.

12. Alpine Climate.—The effect of climbing up a

mountain is very like going a great distance towards the poles. The climate changes as we ascend and gets colder and colder. Near the tops of high mountains it is very cold and, as you know, there is perpetual snow above the "snow-line." But the climate just below the snow-line is not quite the same as in Arctic or Antarctic lands, because on the mountain-tops the air is very thin. So we have a special name for the climate found on high mountains—the "Alpine" Climate, named after the great mountain chain, the Alps of Europe.

#### THE VEGETATION BELTS OF THE WORLD AND THEIR INHABITANTS

For each type of climate there is a characteristic vegetation, and the two in their turn control the animal life, man and his activities. We will take the vegetation belts in the same order as the climates.

1. The Evergreen Equatorial Forests, or Selvas (Hot, Wet Forests).—In the belt of equatorial rains and even in monsoon lands where the rainfall is more than 80 inches in a year, the air and soil are always damp. The moisture and heat cause the growth of luxuriant trees, often of great size. All plants need light and air, and amid the dense rank growth of the equatorial forest there is a constant struggle upwards to reach the light. The big trees grow tall and straight, with a crown of leaves at the top. Other plants reach the light by climbing up the trees—these are the lianes or woody climbers—and often grow to such a size as to kill the tree by which they climbed up. Other plants grow high up on the branches of the trees and reach the light that way. Even in places like Calcutta or Rangoon you will see the branches of the big trees thickly clothed with ferns. In the tallest and densest equatorial forests the mass of leaves is so thick that no sunlight ever reaches the ground, and it is dark and gloomy. This is the case with many of the forests of the Amazon and Congo Basins. Other forests

are not quite so thick, and a little sunlight may reach the ground. The forests of Tenasserim in Burma are like that, and there we find a rich growth of smaller plants (which we call undergrowth) on the ground. The trees of the equatorial forests are of very many different kinds, but nearly all of them have very hard wood. Much of the wood is very fine—like mahogany and ebony—but it is



[Photo : L. D. Stamp.

FIG. 77.—Equatorial rain forest (Burma).

Notice the very big tree on the left—it is over 200 feet high. In the centre are many climbers with woody stems; these are very abundant in equatorial forests. On the right is a tall tree with "plank buttresses" at the base of its stem; these give it a firmer hold in the wet ground. This forest is not nearly as thick as many equatorial forests.

very difficult and expensive to cut down these great hard-wooded trees. Even the evergreen forests of India—which occur on the western coast of the Deccan, and in Arakan and Tenasserim in Burma—are scarcely touched yet.

The equatorial forests are the home of the rubber trees, and rubber collecting is still an important industry in the Amazon forests of South America. But the most and best rubber is now obtained from plantations which man

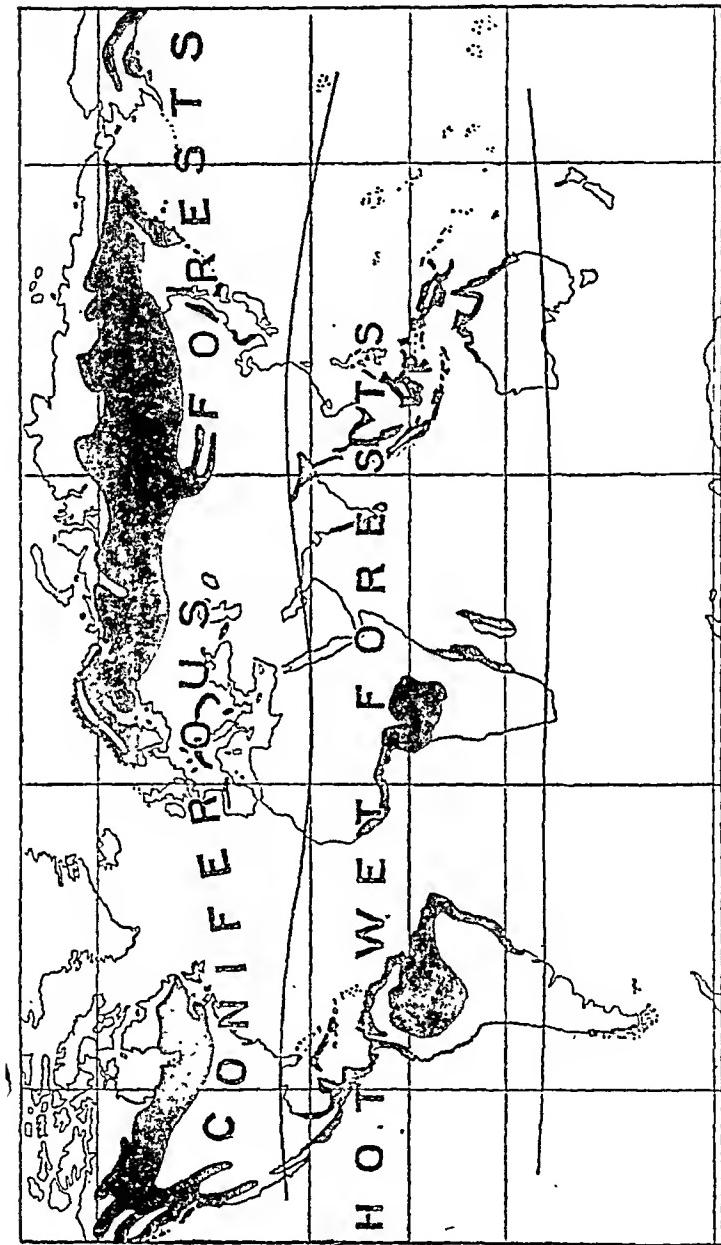


FIG. 78.—The evergreen forests of the world.

has made—on the fringes of the equatorial belt in Ceylon, Malaya, East Indies, and Lower Burma. Another useful tree is the cinchona whose bark yields the medicine quinine. The eoeoa or cacao tree belongs to these regions too, and so also the manjoe. Near the sea, on sandy shores, we find the coconut palm everywhere. Its big seeds, the coconuts, float and are carried by ocean currents, so that the palm is found on nearly all tropical islands. In Africa the oil palm takes the place of the coconut palm.

Animals, like trees, must have light and air, and so we find most of the inhabitants of the equatorial forests are adapted for climbing. The monkeys are typical. In the denser forests nearly all the animal life is to be found in the treetops. There we find all sorts of animals specially adapted for climbing—tree-frogs and tree-lizards as well as birds, and a wealth of insect-life.

How is man to live in such forests? The damp moist air is not good for his growth and development, it is never cold, so that little clothing is required. Many of the trees of the forest yield fruits fit for food. But it is very difficult to cut down the forest and carry on agriculture, for the forest grows up again very rapidly. So we find the equatorial forests are inhabited by very backward uncivilised tribes; many of them, like the Pygmies of the Congo, are of very small size. They wear very little clothing and often have no huts at all, or build small shelters in the trees. Some of them, like the natives of the Amazon Basin, are hunters and wanderers. They live mainly on the jungle fruits. The climate makes difficult any improvement in agriculture or the arts.

**2. The Tropical Grasslands and Savanas.**—The characteristic vegetation of the tropical climate is a rich growth of tall grass with scattered trees. You have learnt of the large area of Africa which has a tropical climate. Nearly all this country is covered with Savana. The grass springs up quickly during the rains, but later in the year is scorched by the sun, and the country is dry and brown during the hot season. Trees become more

numerous as the rainfall increases. Many of the tropical grasslands have strong winds, and very much wind is bad for the growth of trees. We find many of the trees of the savana are umbrella-shaped, so that they expose only a narrow edge to the wind.

You have learnt that the animals of the equatorial forest are specially adapted for climbing—the monkeys, for example, escape from their enemies by their speed



[Photo : L. D. Stamp.

FIG. 79.—African savana land (the Bush Veld of Rhodesia). Notice the rich grass with small scattered trees.

and cleverness in swinging from one tree to another. In the savana climbing animals would have few trees to climb, and so we find the animals are specially adapted to escape from their enemies by swiftness of flight. We really find two main groups of animals—the swift-footed grass-eating animals like the antelopes and giraffes, and the savage flesh-eating animals like the lion and tiger which live on them. Very often the grass-eating animals will be disturbed in the midst of a meal and have to run away. So we

find many of them swallow their food very quickly, and then when they are quiet and at rest are able to chew it over again—chew the cud, as we say. You have all seen cows and oxen doing this.

Just as the savanas (*e.g.* in Africa) have supported vast herds of wild grass-eating animals, so man is able to raise great herds of cattle on the tropical grasslands. So we find the inhabitants of the grasslands are at first hunters hunting the wild animals, later they become pastoral peoples interested in the keeping of herds of cattle. Read what is said of life on the Temperate Grasslands. It is very similar.

3. The Monsoon Lands.—The natural vegetation of the monsoon lands you all know from India. The ground is covered with forests which lose their leaves during the hot season. Trees require a great deal of water, which they drink in through their roots and lose by evaporation through their leaves. In the dry, hot weather it is necessary that the trees do not lose too much water. So in the monsoon forests the trees guard against this loss by shedding their leaves. When the rainfall is more than 40 inches the monsoon forests consist of fine large trees, of which teak and sal are familiar examples. But as the rainfall gets less and less the trees become smaller, and many of them are armed with thorns. The forest, as we say, passes into thorn forest and scrubland, and finally into desert with only a few scattered shrubs. Scrubland covers much of the Deccan, and passes into desert in the great Indian Desert. Here we have an example of how, with decreasing rainfall, rich forest passes gradually into desert. The monsoon forest is not so thick and dense as the equatorial forest, and large areas can easily be cleared for agriculture. Many plants of great value to man flourish in the monsoon climate. There are timber trees and bamboos, fruit trees like the mango, bread fruit and manioc as well as plantains and bananas. More important still are the cereals, rice in the wet lands and millet or sesamum in drier parts. On certain soils cotton flourishes, tea

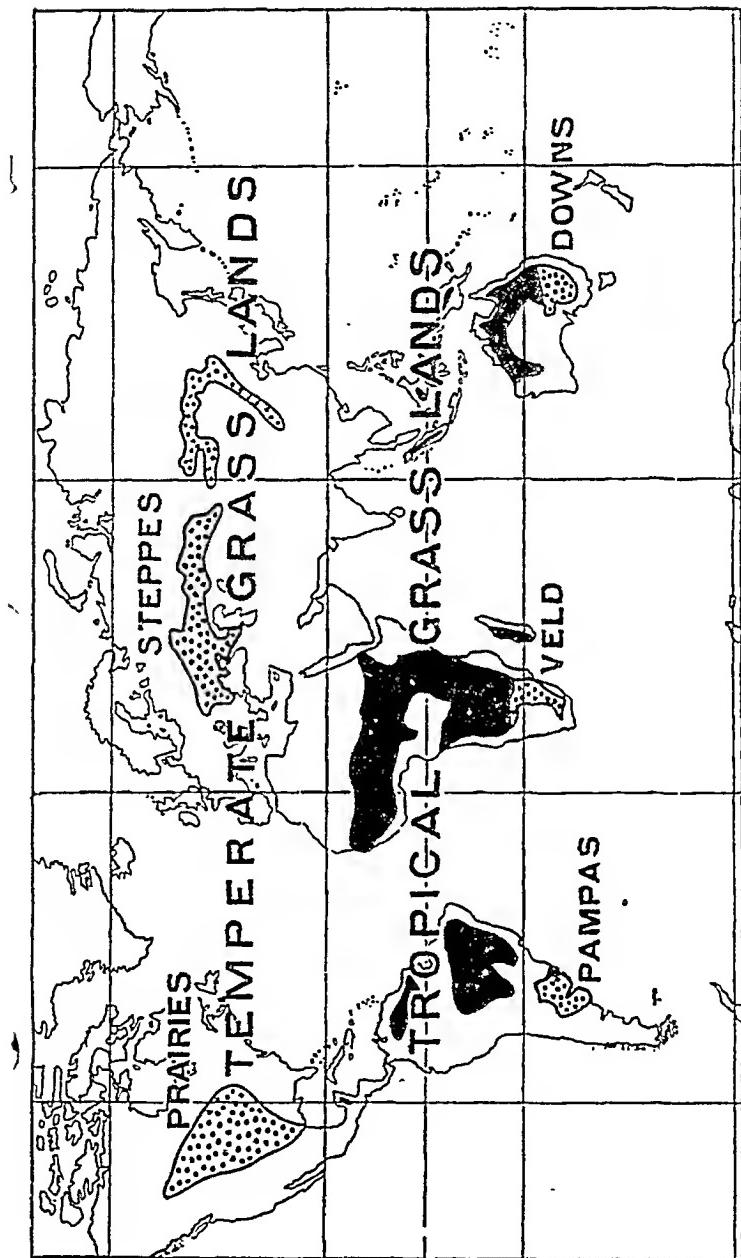


FIG. 80.—The grasslands of the world. The tropical grasslands or savanas are shown in solid black; the temperate grasslands by dots. The word savana may be spelt "savanna" or "savannah."

and coffee grow well on hill slopes. Maize can also be grown and wheat as a winter crop.

The monsoon climate is, then, very favourable to the growth of food crops. So we find most of the monsoon lands are very thickly populated. In some parts it is very easy to obtain sufficient food and the people get lazy, but if they do not let themselves get lazy there is great opportunity of becoming rich or learned, and so we find a high state of civilisation in many monsoon lands.

4. Tropical and Temperate Deserts.—In talking about the monsoon lands we said that as the rainfall gets less the monsoon forest becomes poorer and poorer, passes first into scrubland and then into desert. In the same way grassland becomes poorer and poorer, and passes eventually into desert. Thus desert is sometimes very, very poor grassland, at other times very, very poor scrub or woodland. There are few deserts where absolutely *nothing* grows. We find desert plants have different means of storing water. Some of them have very, very long roots which go down to great depths and there reach water; many have fleshy stems and leaves in which they can store up water; in many the stems and leaves are covered with a thin coating of wax which prevents loss of moisture; still others are armed with sharp spines and thorns which protect them from being eaten by animals.

Then we must not forget the fertile spots, called oases, in the middle of the deserts. Some of these oases consist merely of a clump of palms surrounding a small spring of water, but others are many hundreds of square miles in area and very fertile. The most typical tree is the date-palm.

When we look at the animals of the desert we find there are only a few, and they usually have a dull brown colour which exactly matches the sand and prevents them from being seen. The most typical animal is the camel, which is able to go many days without water and which has a broad foot to prevent it from sinking into the sand.

There are two classes of inhabitants in the desert—the

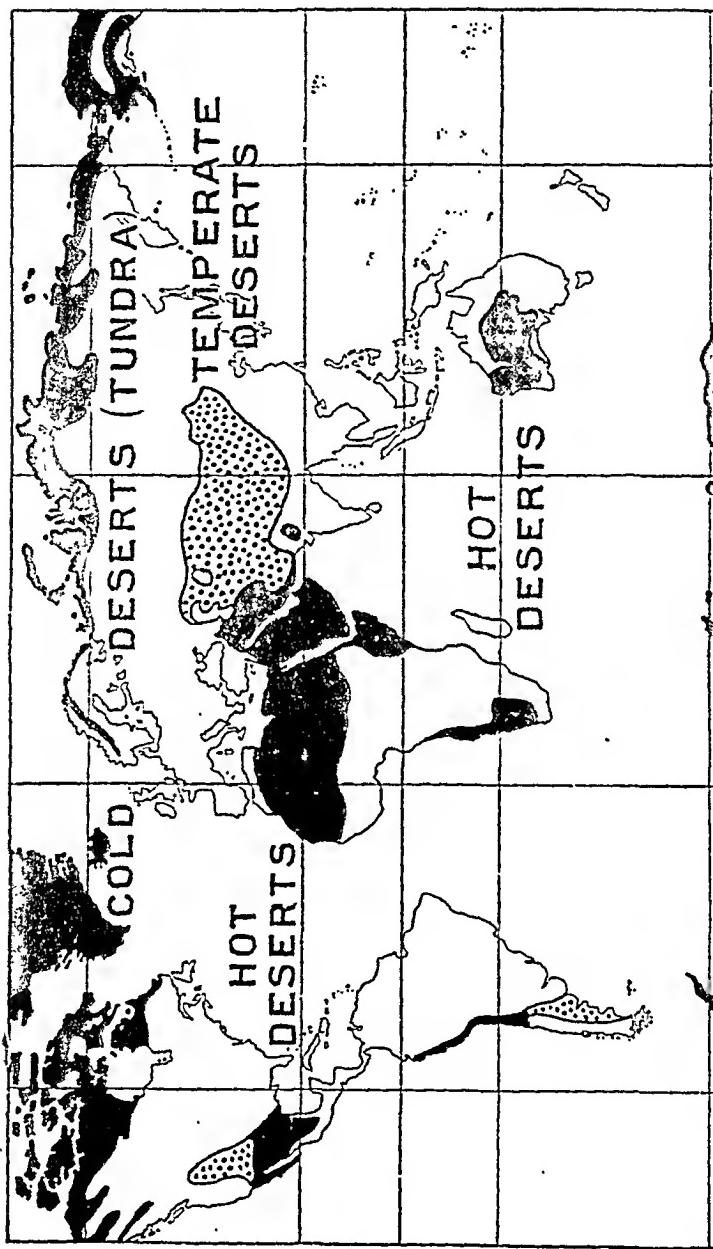


FIG. 81.—The deserts and semideserts of the world.

Notice what a large part of the land surface is waste, desert land. Try and name each of the desert areas shown on this map.

wanderers who move with their camels from place to place, and the settled population of the oases who devote themselves to growing rice and rearing cattle, and especially to the cultivation of the date-palm. People living in the desert have little to see except the vast expanses of rocky and sandy waste. They must study the stars to guide them by night, and so we find that the desert has produced philosophical peoples—people who have plenty of time to think, and people learned in mathematics and the study of the stars. The wanderers live mainly in tents, but the dwellers in the oases build houses with thick stone walls—to keep them cool—and flat roofs, for there is no need to guard against rain. Those of you who live in the dry parts of North-West India know these flat roofs well.

5. Mediterranean Lands.—In the Mediterranean climate with its mild moist winter and hot dry summer, the plants grow mainly during the winter and have to protect themselves against loss of moisture during the hot dry summer. The vegetation of Mediterranean lands consists chiefly of small trees and shrubs, usually with small leathery leaves well adapted to withstand loss of moisture. Others, such as the olive, have leaves covered with silky hairs; others, like the vine, have very long roots. The Mediterranean trees are remarkable for their fine, luscious fruit. The most important plant is perhaps the vine, whose fruit (grapes) is made into wine as well as being dried. Then there are well-known fruits like oranges, lemons, peaches, apricots and pears; nuts, such as the almond, and many others. All of you know the tinned fruit which is sold all over India. Notice the labels of the tins. Most of it comes from California, some from Australia—from regions of Mediterranean climate. Some of the trees protect themselves from loss of moisture by having a very thick bark. This is of value as the source of cork. Wheat grows well in some Mediterranean lands. In damper or irrigated regions rice may be grown.

The climate of Mediterranean lands is so favourable that it has harboured many of the great civilisations of the

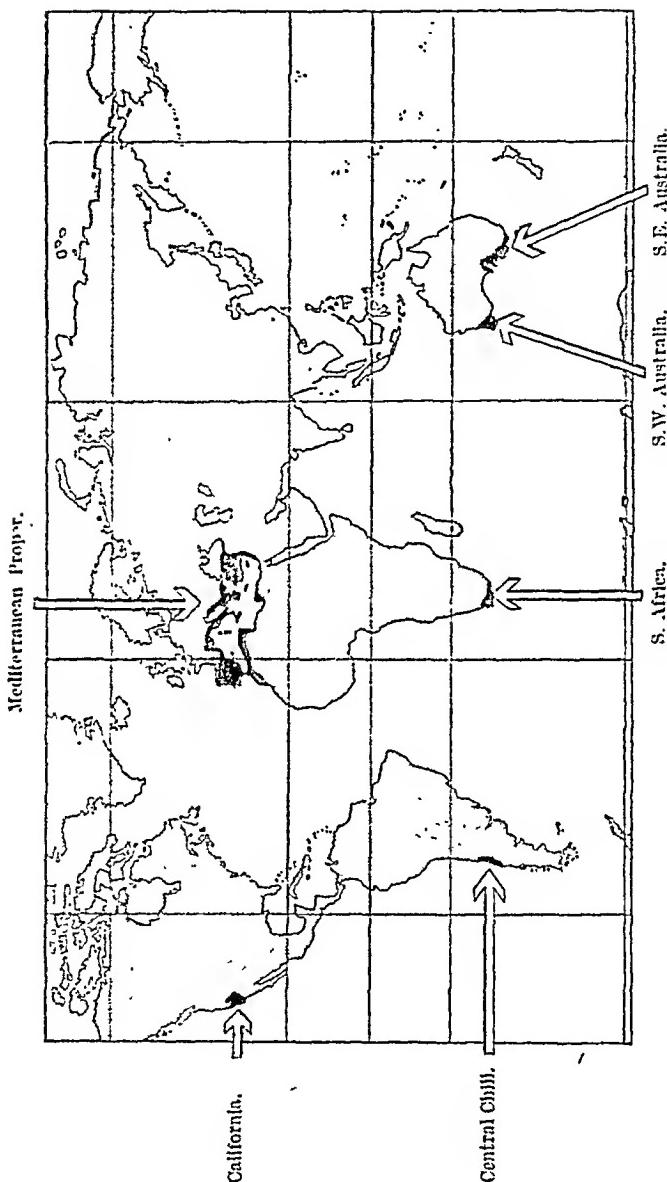
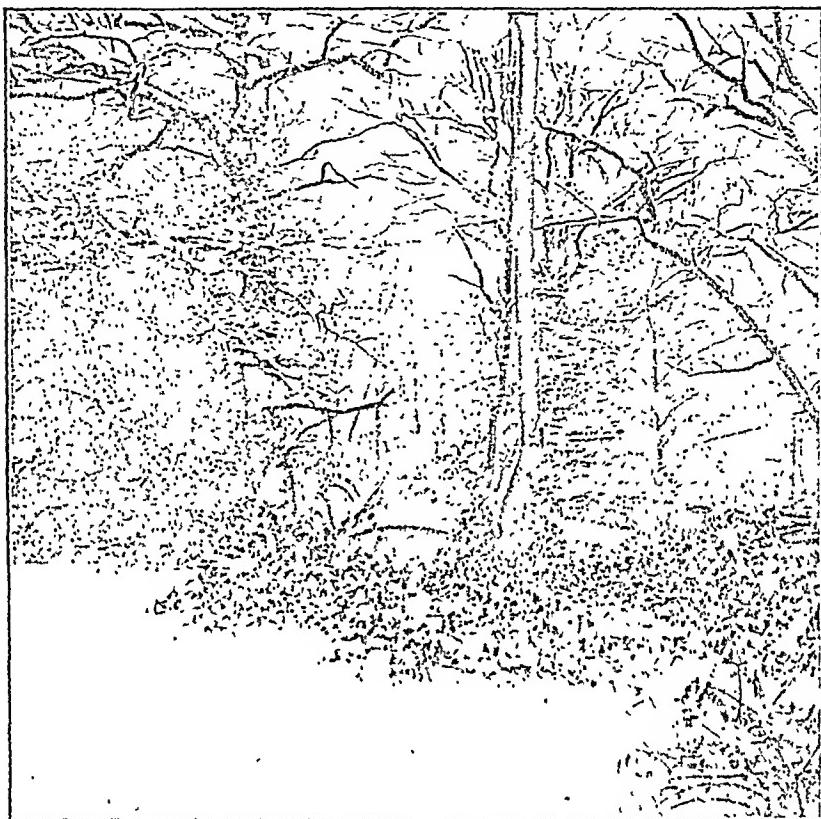


FIG. 82.—Map of the world, showing the Mediterranean regions.

world—Greece and Rome. But food is easily obtained and the pleasant climate tends to make the people lazy and too easily contented, as are the Italians at the present day. Their houses are usually thick walled and of stone



[Photo : F. Frith and Co., Ltd.]

FIG. 83.—Deciduous forest in winter (England).

Notice that the trees have lost all their leaves and snow covers the branches and the ground.

to keep them cool during the hot summer, whilst in the towns we find the people build shady "piazzas" over the pavements, just as the big European shops do in India.

6. Warm Temperature Forests.—The lands having a warm temperate climate are forested, and the forests are

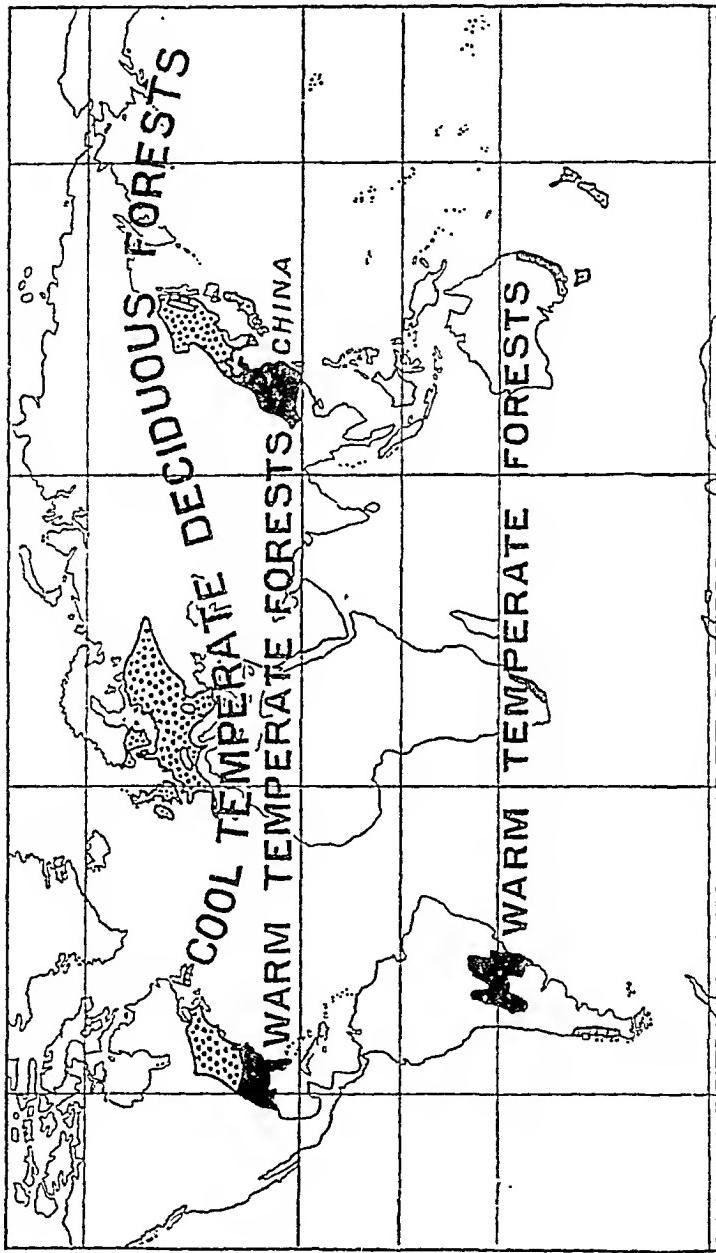


FIG. 84.—Temperate forest regions.

often very similar to those of monsoon lands but of different trees. Both maize and rice grow well, and these lands are thickly peopled—as, for example, China and the south-eastern part of the United States.

7. Cool Temperature Deciduous Forests.—In the monsoon lands, the trees loose their leaves to protect them against the heat of the hot season. In the cool temperate deciduous forests the leaves are lost during the winter to protect the trees against the cold and frost. In America the end of the summer is called the “Fall,” because it is then that the leaves “fall” from the trees before the cold of winter comes on. Many of the trees of these forests yield valuable wood—oak, elm, beech, birch, and maple. Forests of this kind formerly clothed a great part of North-Western Europe—including England—but have been cut down to make room for agriculture and pastoral industries. Many grains do well in this climate. We must notice that the plants require much less rain than in countries like India, because the sun is less powerful in summer and does not dry up the moisture to the same extent. South-Eastern England has a rainfall of about 25 inches (roughly the same as the centre of the dry belt in Burma or the driest parts of the Deccan in India), yet the country is clothed with green grass for the whole year. So we find wheat growing well in the drier parts, as in the east of England, where the rainfall is less than 30 inches. In damper regions the grass grows richly and affords fine pasture for cattle. Sheep are found in the drier or hilly parts. On poorer soils and further north wheat is largely replaced by oats. Barley likes the same climate as wheat, but will grow also in cooler places. Over much of the continent of Europe rye is grown under the same conditions as oats. There is no grain which furnishes such good and nourishing bread as wheat, and the demand for wheat, already enormous, increases yearly amongst the white races.

This cool temperate oceanic climate is healthy and invigorating. Hard work during the whole year is needed in farming; it is not too hot in summer to prevent work

during the whole day, and in the winter work is essential to keep warm. So we find the great North European and American civilisations have been fostered by this climate. The houses must be substantially built, for the winters can be very cold and there is no season of the year when rain does not fall.

8. Temperate Grasslands.—The grass in temperate continental climates is usually shorter and less luxuriant than in tropical grasslands, and flourishes even with a rainfall of less than 15 inches. There are vast stretches of these lands without a single tree. The temperate grasslands have received different names in different continents—Steppes in Asia and Europe, Prairies in North America, Pampas in South America, Veld in South Africa, and Downland in Australia—but they are very similar throughout. In spring the ground is fresh and green and rich with flowers, in summer the sun scorches the grass and the whole country becomes brown, whilst in winter it is often snow-covered and the rivers turned to ice.

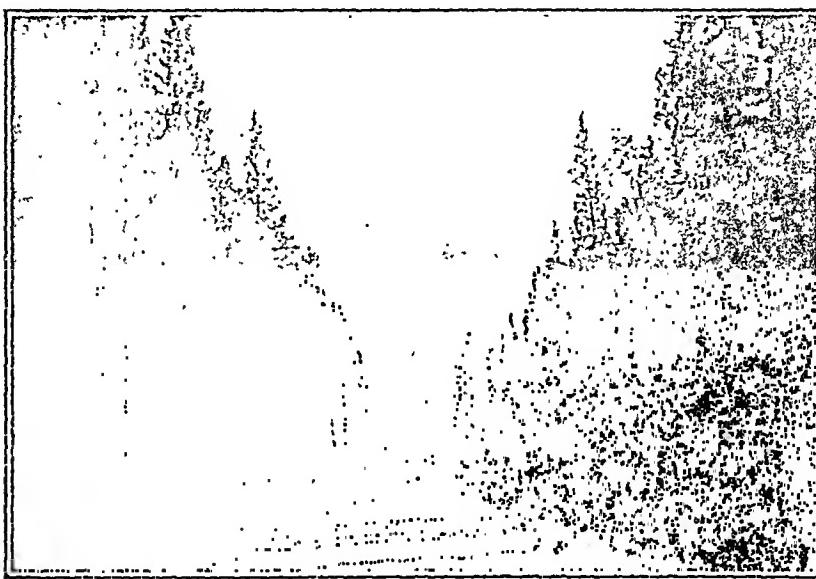
As in the tropical grasslands, we find swift-footed grass-eating animals. The horse, ass, and sheep are all typical of these lands.

The inhabitants of the grasslands are nomads. They wander about from place to place with their flocks, for when the grass dries up in one region a move has to be made to find fresh pasture elsewhere. In richer regions cattle are most important, in drier parts sheep and goats. The people are fine horsemen, for they have to spend much of their time riding, watching the vast flocks and herds. In past ages the grasslands have acted as great "reservoirs" of people. After a series of bad seasons it may be necessary for a great body of people with their herds and flocks to move bodily in search of fresh lands. In this way great waves of people have swarmed out of the grasslands and settled in surrounding countries. In the centre of Arabia are grasslands from which the Arabs have come out and overwhelmed the lands round about.

In recent times the richer areas of grassland have

been rendered suitable for wheat cultivation, and farming has largely replaced the pastoral industries.

9. **Cold Temperate Coniferous Forests.**—Stretching as a great belt across the Northern Hemisphere is a vast tract of evergreen trees with needle-shaped leaves—trees which yield valuable soft timber. Much of the moisture in this region falls as snow and not as rain. The forests are inhabited by animals which have a thick fur to protect



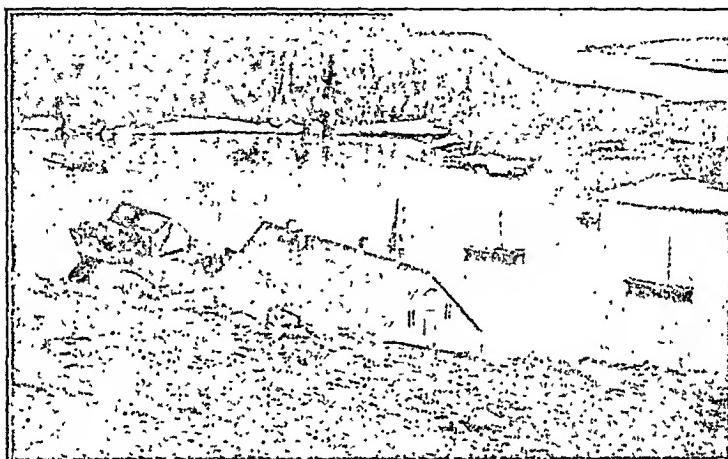
[Photo: E. C. Stamp.

FIG. 85.—Coniferous forest amongst the Rocky mountains at Banff, Canada.

them from the bitter cold of winter. So many of the inhabitants are hunters. Naturally logging and timber-working industries are important. The trees are felled during the winter, dragged over the slippery snow and floated down the rivers when the snows melt.

Similar forests cover large areas of the higher regions of Central Europe—there are fine forests on the mountains of Germany and Switzerland and the Carpathians. Wood is abundant and so is the general material for dwellings,

which range from the rough log-huts of the North American settlers to the fine wooded "chalets" of Switzerland. In India we are accustomed to think of burning off the under-growth in the teak forests every year—about February or March. In the coniferous forests fire is something very much to be feared, for it destroys the whole forest and is very difficult to check. A forest fire in these forests is a very terrible thing.



{Photo: Moravian Missions.

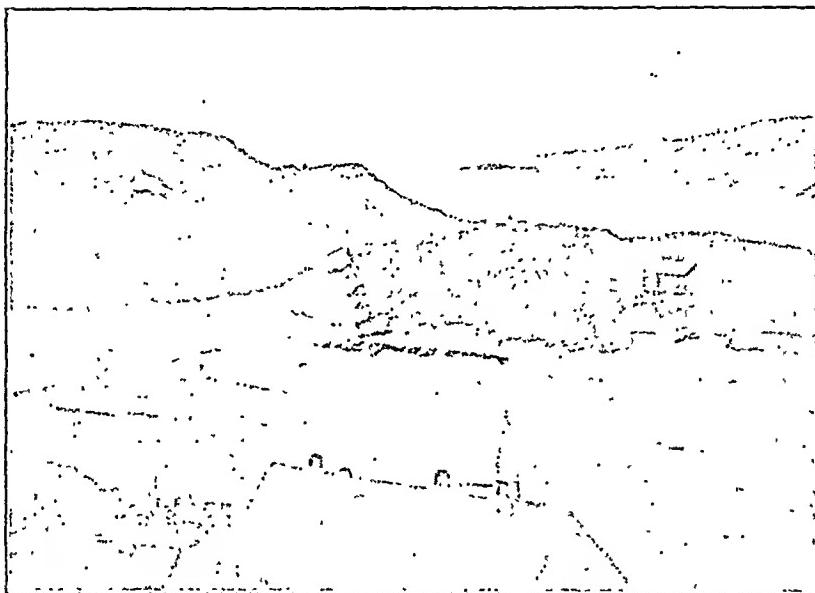
FIG. 86.—Killinek, Labrador, in the warm season.

Notice the bare ground of the Tundra region.

**10. The Tundras or Cold Deserts.**—In Arctic and Antarctic regions are vast stretches of desert land—desert not because of the heat as in the hot deserts, but because of the extreme cold. It is too cold for the growth of trees, and practically the only vegetation is moss and lichens. The reindeer is almost the only animal, and furnishes meat, milk, and clothes for the few poor inhabitants of these dreary "barren lands." Agriculture is impossible, for the ground is frozen for three-quarters of the year. In some parts of the tundras the short sharp summer produces a

wealth of flowers, but for the remainder of the year the ground is snow covered.

11. Alpine Vegetation.—As we ascend the sides of a mountain we often pass through the same vegetation zones as if we went on a long journey towards the poles. Thus



[Photo: Moravian Missions.]

FIG. 87.—Killinek, Labrador, in the cold season.

Notice that the sea is frozen over. Notice the steamer in the far distance frozen into the ice. This photograph was taken in the cold season when the snow has already melted from the land.

on the Himalayas we find coniferous forests like those of Northern Europe. The grasslands which are often found clothing mountain sides are important, because they afford pasture for sheep and cattle. These "Alpine pastures" are especially important in Switzerland.

## F. MAN ON THE EARTH

IN the last section you learnt how much man is controlled by the climate and vegetation of the countries in which he lives. The more backward and uncivilised tribes are almost completely controlled by their surroundings, and as examples we have the Pygmies of the Congo Basin, the American Indians of the Amazon, and the Eskimos of the Tundras. As man grows wiser and begins to apply his knowledge or, as we say, becomes more civilised, he is able to overcome many of the disadvantages of his surroundings. He brings water in canals and makes deserts fertile—as he has done in many of the dry parts of India ; he clears away large areas of forest and plants crops suitable for food ; he grows grain on the grasslands where formerly he wandered about with only his herds. Again, he can build railways and ports so that food can be brought quickly to even the most barren desert places ; telegraph lines and wireless stations keep every part of the world in direct touch with the great centres of life. Gradually man seems to be conquering the terrible diseases of the world, and it is now possible to live in unhealthy parts of the earth where formerly man found it difficult to remain alive.

There are still, however, enormous areas of the world where all the efforts of man are of little use. He cannot make fertile the great frozen wastes of the Tundra lands, because he is unable to prevent the ground freezing and the coasts becoming blocked with ice. He is unable to render fertile enormous hot deserts like the Sahara, though

he may one day try. Again, in the regions of the great equatorial forests like the Amazon Basin his efforts to clear the forest and make room for cultivation are overwhelmed by Nature, who causes the forest trees to spring up again with great persistence, or washes away the soil left bare for a short time.

#### OCCUPATIONS OF MAN (PRIMITIVE PEOPLES)

We are now going to study the main occupations of man in different parts of the world. We shall start with the simple occupations of primitive man before he learns the arts of civilisation.

**Gatherers.**—There are still a few peoples in the world who live mainly on the fruits or roots of plants they find growing wild. Their life is spent in gathering sufficient for their daily food. As a rule they are hunters too, and sometimes fishermen. They wander about from place to place in their search for fruit and animals. They are only able to make the very poorest huts or dwellings. The men and women have a hard life ; they often die of hunger, they are often small in stature and weak. We find such peoples both in the thick forests of the equator—the Pygmies of Africa and the Americans of the Amazon—and on the fringes of deserts—the Bushmen of South Africa and the Australian natives. Often they have fled to these inhospitable regions because stronger and more civilised tribes have taken possession of all the better lands.

**Fishermen.**—We find people who depend mainly on fishing for their existence all over the world, both amongst backward and amongst highly civilised races. In the frozen north are to be found the Eskimo and the inhabitants of the Barren Lands of North America ; in Equatorial regions are peoples like the “Sea Gypsies,” who live amongst the islands of Lower Burma and Malaya. There are some regions of the sea which are specially suited for fish and where fish are found in enormous numbers. Such

regions attract men of the civilised nations, and they spend their lives as fishermen. Examples are Newfoundland, off which island are the Great Banks famous for cod; the western coast of Canada, where the rivers are full of salmon. You all know the tinned salmon sold all over India; much of it comes from here. Then there is the Dogger Bank in the North Sea, which attracts fishermen from England, Norway, and Germany. Most fishermen



[Photo : L. D. Stamp.

FIG. 88.—A fishing village in the tropics (Penang).

Notice the hut built on props on the sandy shore, with coconut palms in the background and the fishing boat in front.

spend much of their time on their boats, but build villages and towns along the nearest sea-coast, where their wives and families dwell and where they can live in stormy weather. Some fishermen have to go great distances to their fishing ground—such as those who go after whales in polar seas. Fishermen, too, are usually skilful swimmers and divers, and most nations who in their early days were very largely fishermen have developed into great sea-

faring nations. Examples are the Norwegians, Britons, and Japanese.

**Hunters.**—All over the world wild animals are becoming more and more scarce, and there are now very few peoples who live entirely by hunting. In the old days little groups of men or tribes wandered about the great grasslands of the world in search of animals for food. Good examples were the North American Indians—"Red



[Photo: L. D. Stamp.]

FIG. 89.—A fishing village in England.

Notice the small harbour with the fishermen's boats, and the fishermen's cottages built of stone or brick so that the people can keep warm in the cold winter.

"Indians" as they are often called, although they have no connection at all with the inhabitants of this country. Many of the peoples of Africa were also hunters. The men did most of the hunting, while the women stayed behind to prepare the food and make rough shelters for the hunters when they returned. Where once the Indians roamed across the prairies of America we now find trains roaring along with their load of grain from the far-stretching wheat-

lands which have replaced the wild grassy plains. Hunting is still important in the far north, but the animals are no longer hunted for the sake of food but for the sake of their skins and furs.

**Shepherds.**—Whilst the people of the grasslands of Africa and America were hunting wild animals until recently, the inhabitants of similar regions in Europe and Asia had for thousands of years been keeping flocks of sheep, goats, and cattle. For travelling and for moving about rapidly to tend their flocks they kept horses and asses and became very skilled horsemen. In the old days a man's wealth was reckoned by the number of sheep and cattle he possessed, for from them he and his family supplied all their needs : food, drink (milk), clothing (from wool), and even their dwellings, which were made of skins. Water was often scarce in the grasslands and was carried about in bottles made from the whole skins of animals, just as we see it being carried about in many parts of India to-day. The shepherd peoples had to wander about from place to place in search of good grass, and often, in bad years, they moved far away and found some fertile land where they drove out the native inhabitants and settled down to farming.

**Farmers.**—A large proportion of the peoples of India can be classed as farmers or cultivators. We find all stages from the hill tribes of Burma and Assam, who make a small clearing in the forest around their village and grow just sufficient for their daily food, to the cultivators whose life is devoted to the production of quantities of paddy, not only for themselves but for sale. Let us consider here the primitive farmers who have only their own wants to consider. As a rule they build a small village with huts which are just sufficient for shelter from sun and rain, and constructed of the bamboos of the local jungle and thatched with grass or leaves. They keep a few cattle, usually for ploughing, and perhaps the headman of the village may possess a pony. A small area of forest is cleared—in this country it is often cleared by burning, so that the ashes of

the trees nourish the ground—and a few crops grown. After one, two, or more years when the soil becomes poor another area of forest is cleared. This process is very wasteful, and large areas of valuable forest have been destroyed in this way in Burma, Malay Peninsula, and other countries. In the drier parts of India and Burma sesamum or millet is the principal grain; in the wetter parts flat areas are cleared and paddy is grown. Around the villages bananas, mangoes, and a few other fruit-trees and palms may be planted.

#### OCCUPATIONS OF MAN (CIVILIZED PEOPLES)

Primitive people who live entirely on what they themselves can grow or make must be content with a very little. As soon as people learn about the world around them they realise that there are many things they can do to improve their own existence, but at the same time that there are many most desirable things which they cannot produce themselves. Civilisation commenced when people began to realise that they should strive to better their existence. Gradually man realised that the natural grains and fruits could be improved by cultivation, and so agriculture improved. Then came the knowledge that for efficient working some must devote themselves to one work and some to another (division of labour). Later came the knowledge that many of the comforts they desired could only be obtained from outside countries, and foreign trade commenced.

If we look at any civilised country at the present day we notice that there are different sections of the people who each have their particular work to do, yet each group is essential to the life of the country. There are the farmers or cultivators who produce the food, the merchants and shopkeepers who buy and sell, the people who work the railways, steamers, and other means of travelling from one place to another, the builders who construct the houses,

the teachers who look after the education of the children, and so on. We find, too, that every country produces something which it is able to send away to other countries, and every country has something which it must receive in exchange. Some very big countries can produce most of the things they require, but not all.

**Agriculture and Industry.**—If we look at the whole world we find we can separate the people into two broad classes. There are the people who grow things and the people who make things. The growing of things can be grouped under the term "agriculture," and the making of things under the term "industry." In its simplest form trade consists of the exchange of food for manufactured articles ; it is an exchange between the people who grow things and the people who make things. Although nearly all countries both grow and make things, usually one is more important than the other and so each country or each big region of a country can be classed as "agricultural" or "industrial." Look at Fig. 90 ; it shows the main agricultural and the main industrial regions of the world. Fig. 91 shows you the most thickly populated areas in the world. Notice that both agricultural and industrial regions may be thickly populated. India, except for small areas round Bombay and Calcutta, is an agricultural country.

There are, of course, other occupations in civilised countries, but again we can divide them into the producing and the manufacturing. Mining is often very important, and we can divide mining and the industries connected with it into the producing side—that is, mining the coal or minerals from the earth—and the manufacturing side, when the metals are obtained from their ores and made into useful articles.

The most essential point to remember is that in primitive peoples we only had to consider their main occupations because the wants of the people are slight and they supply them all themselves. Even in the most primitive and backward tribes, however, there is some sort of "division

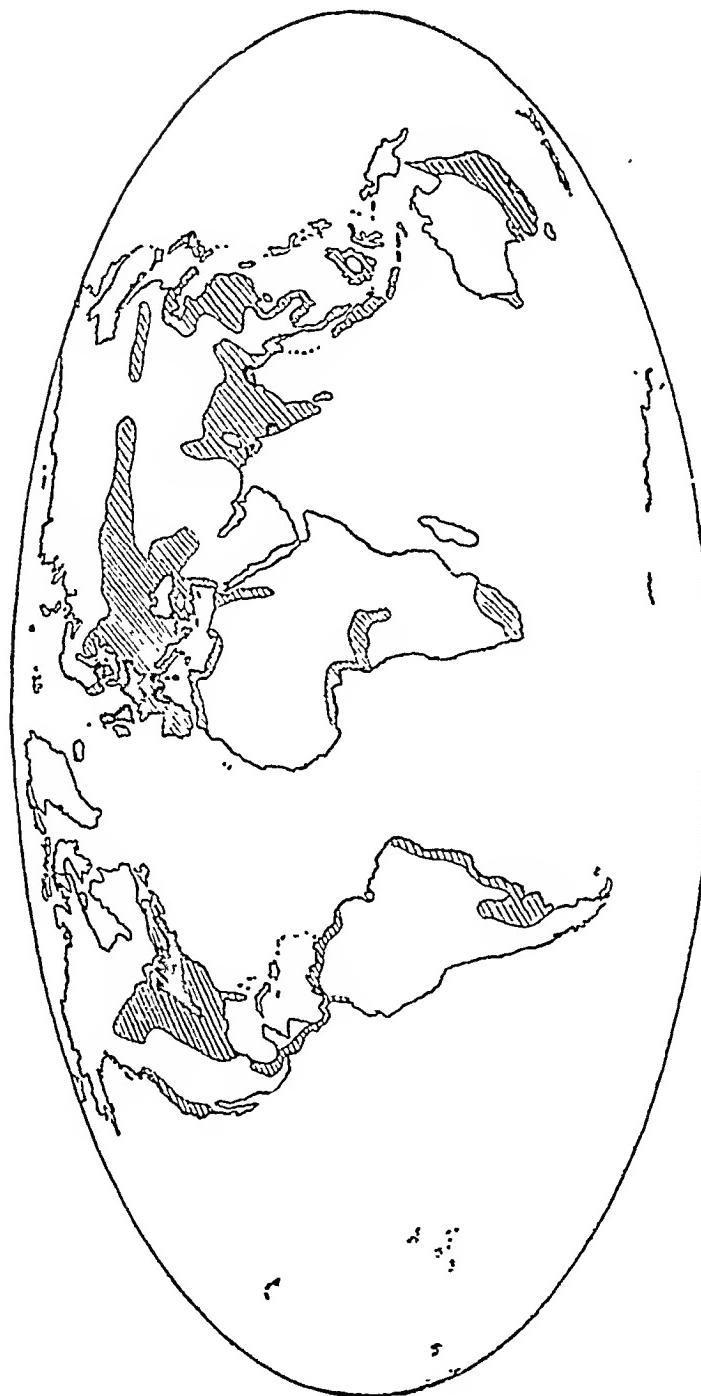


FIG. 90.—Agricultural and industrial regions of the world. Industrial regions black, agricultural regions lined.

[From French and Stamp's "Geography of Burma for Schools."]

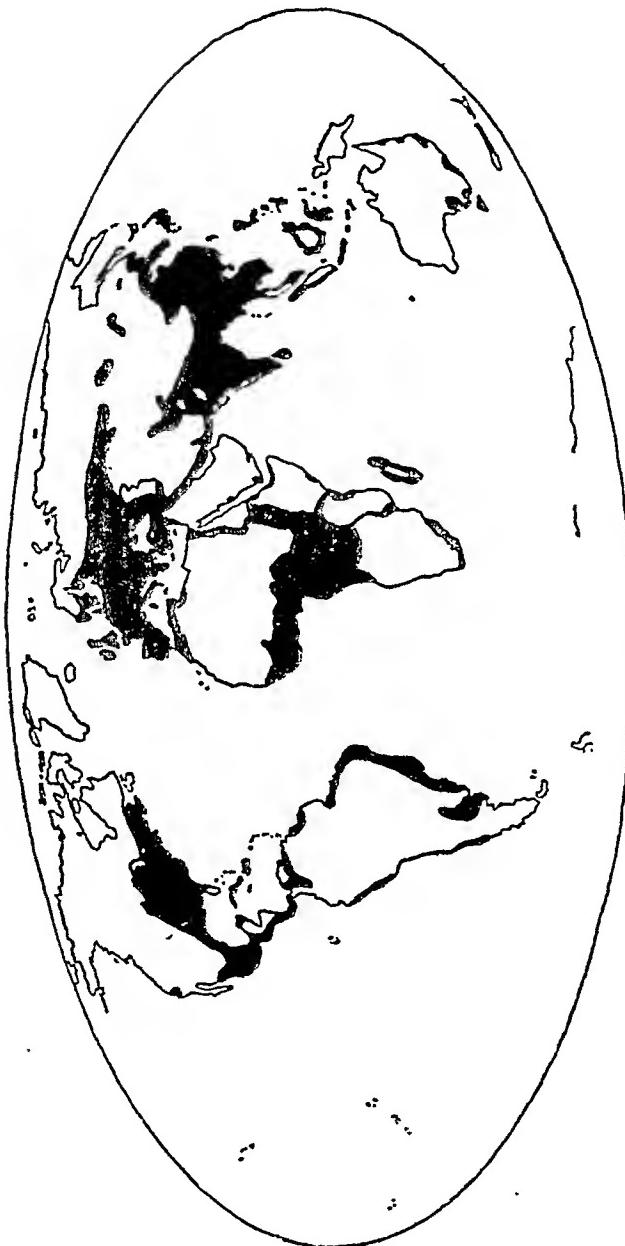


Fig. 91.—Population map of the world. All parts in black have more than eight persons living on each square mile of ground.

[From French and Stamp's "Geography of Burma for Schools,"

of labour." We said that with the hunters the men do the hunting whilst the women look after the cooking and domestic arrangements. As the people become more and more civilised the "division of labour" becomes more and more marked and every one has his own particular work to do, and often it is quite different from that of his neighbours. One man may be a clerk, another a shopman, another a farmer, another a miner, another a railwayman, and so on. Yet all of them are equally important to the country.

We will now study some of the most important occupations in civilised countries.

#### AGRICULTURE.

Perhaps agriculture is the most important of all, because agriculture supplies the main food of the people. We can distinguish three main kinds :

(a) *Crop farming.* The growing of "crops" of grain in large quantities, such as paddy, wheat, barley, etc. With this we can include cotton, flax, etc., which are grown not for food but for clothing.

(b) *Mixed farming,* when each farmer grows a variety of crops according to local needs, or according to the suitability of his soils, and also keeps some cattle or sheep.

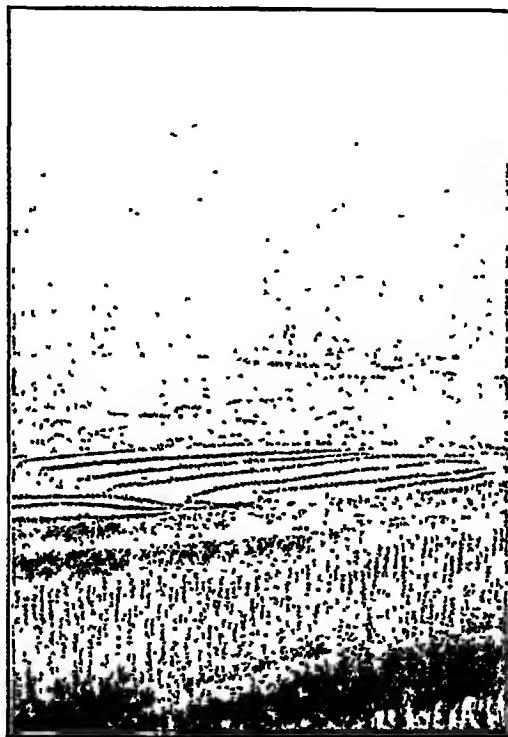
(c) *Stock farming*—that is, the rearing of cattle and sheep. This is not really "agriculture," but is usually included under it. The animals are reared both for food (*i.e.* meat), including milk and cheese which is made from it, and also, in the case of sheep, for wool for clothing.

#### Crop Farming

Let us now consider some of the most important crops in the world.

**Rice.**—Rice is the most important food grain in hot wet countries. It is quite different in its requirements from all other grains. The seeds must be sown in a clayey

or loamy soil under a few inches of water, and the young plants grow up through the water. As a rule the seeds are sown in "nurseries," and then the young plants are taken up and planted out by hand in small tufts—again



[Photo : L. D. Stamp.

FIG. 92.—Paddy terracing (Java).

Notice the large number of small fields cut down the side of the hill, so that no land is wasted.

under water. This is very hard work, but the yield of rice is very good and it pays for the trouble. The roots must be surrounded by water until the plant has reached a good size. Then the fields are allowed gradually to dry and the grain to ripen with the sun's heat. It will be seen

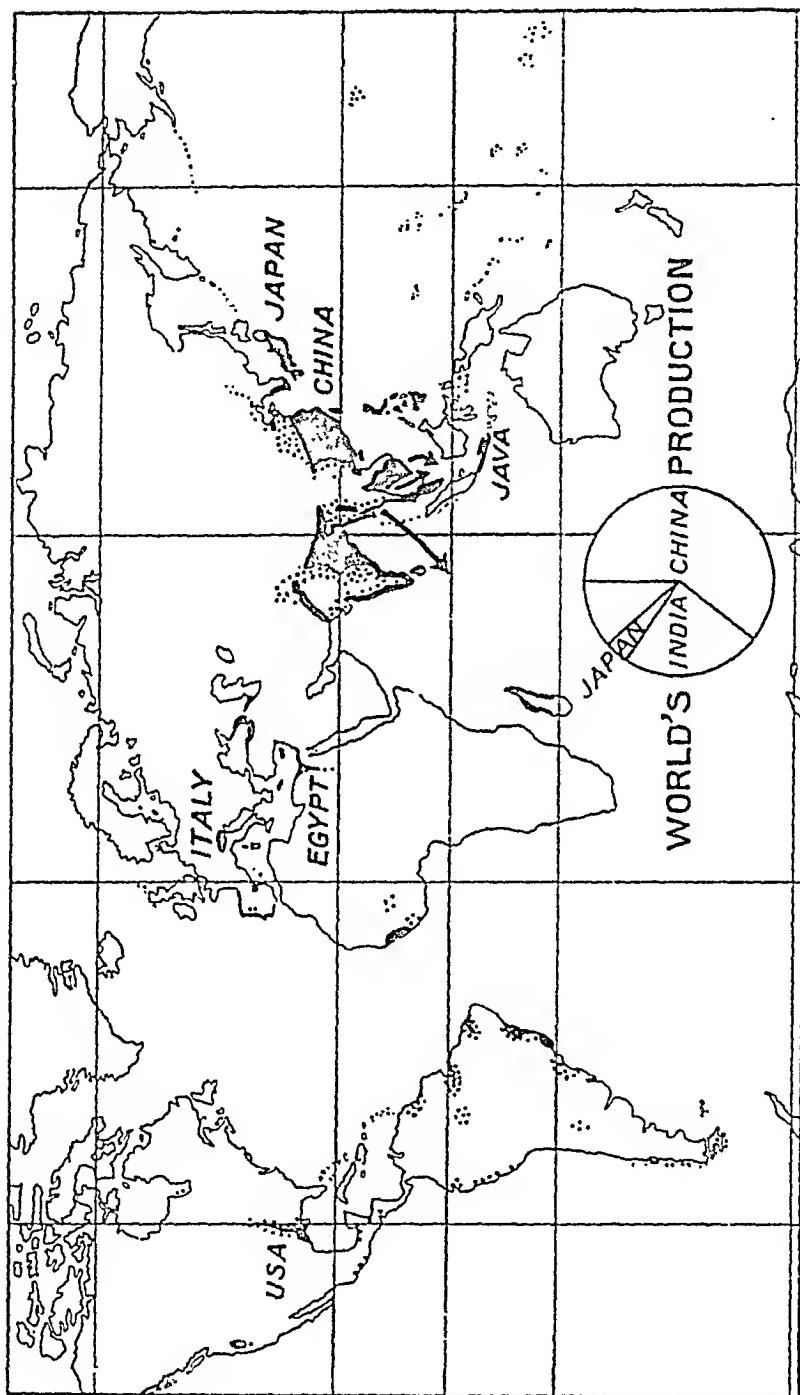


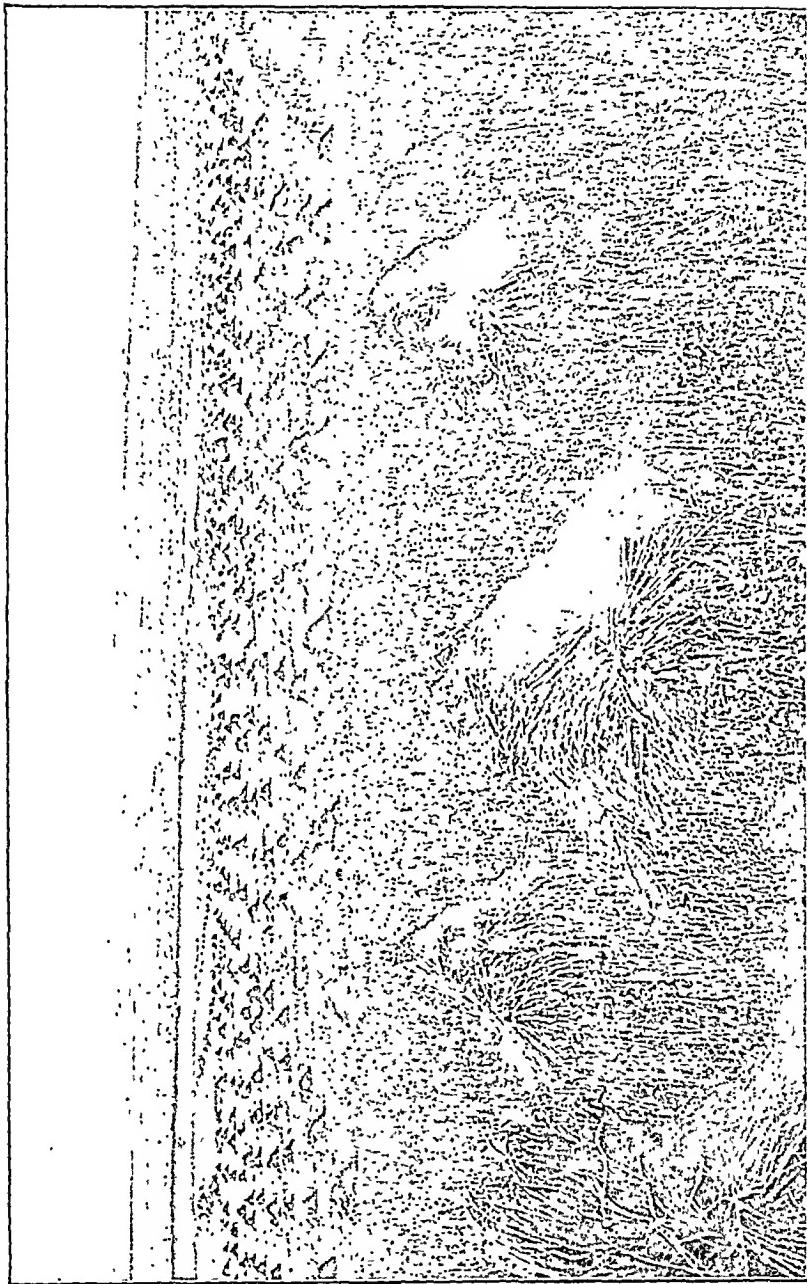
FIG. 93.—Rice lands of the world. The three arrows show the regions from which rice is exported. Notice that China and India, which grow the most rice, have none to spare for export. Rice is exported mainly from Burma, Siam, and French Indo-China.

that rice requires a great deal of water, and flat land so that the water does not run off. The best land for rice is in the great alluvial plains and deltas like the Ganges Valley and the Irrawaddy Delta. In more hilly countries paddy or rice fields must be made by "terracing," so that the fields are like a number of flat steps down the hillside or valley. We see this in Ceylon and in many parts of Burma as well as in various parts of India. To do well rice requires 60 or 80 inches of rainfall; with less than that the crops may fail. But huge quantities of rice are grown in irrigated areas, such as the Indus Valley and the dry part of Burma, where the water is brought artificially to the land by canals which man has made.

Rice with the husk on is called paddy, and so we nearly always talk about "paddy-growing" and "paddy-fields"; but European peoples, who only see the paddy when the husk has been removed, call it "rice."

In monsoon countries the seed is sown during the rains, and gradually ripens as the rains cease, and is ready for cutting in the cold weather or a little later. In countries nearer the equator, where there are two rainy seasons, two crops a year are often possible. We saw that the Warm Temperate Oceanic Climate is very like the Monsoon Climate, and it is also very favourable to rice. Notice in what parts of the world we find (a) Monsoon Climate, (b) Equatorial Climate, (c) Warm Temperate Oceanic Climate. These will be the rice-producing areas, and more rice will be produced where the lands are inhabited by civilised peoples. A little rice can be grown in some parts of the Mediterranean regions where there is sufficient water. The grain grows in the warm moist winter and ripens in the early part of the hot summer. Look at the map and notice the countries.

**Maize or Indian Corn.**—This grain does not require nearly so much water as rice; it grows, too, in cooler places. We must notice, too, that it is grown for several purposes; sometimes the grain is required for food, but at other times it is grown as food for cattle, both the luscious green shoots



[Photo: Govt. of Canada, Immigration Dept.]

FIG. 94.—A wheatfield in Alberta, Canada. Crop farming on the Prairie.

Notice the huge area devoted entirely to wheat.

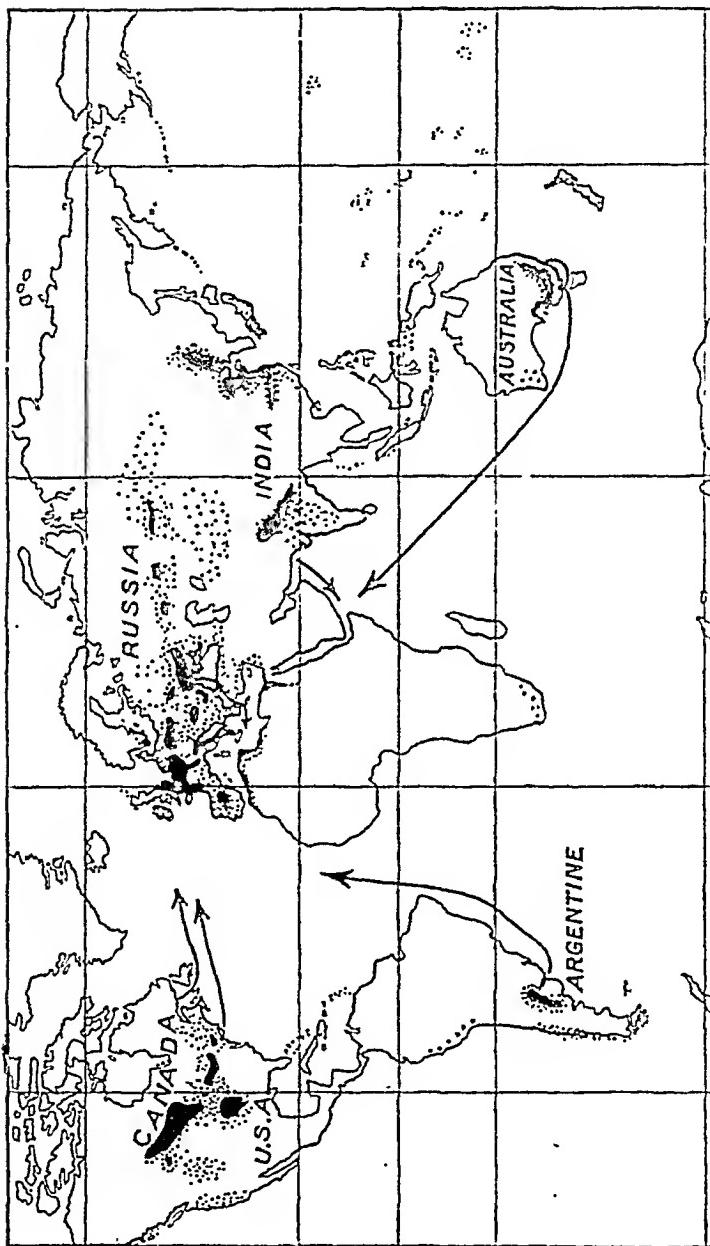


FIG. 95.—Wheatlands of the world. Europe (except Russia) eats more wheat than she can grow and so imports from Canada, U.S.A., Argentina, India, and Australia.

and the corn being used. It only rarely forms the principal food of a people, and so it is grown in patches over large areas of the world, but not as the principal crop. Over parts of South Africa, however, it is both the staple food of the negroes and the principal crop of the country.

**Wheat.**—Wheat is the most important of all grains since it makes the best flour and bread, that is, the best for the growth of man's body. It forms the principal food of nearly all white peoples, and the demand increases yearly. As a result very large areas are given over to wheat cultivation. There are many different varieties, and a variety which is suitable for growth in India with a monsoon climate will not grow at all in England with a cool temperate climate. All varieties of wheat require :

(a) Rain or moisture to make the young plant grow. The growing season should be long, cool, and moist.

(b) Sufficient sun to ripen the grain. The ripening season should be warm and dry, but not too hot. The temperature must be at least 60° F. for three months. It is important to have a little rain just before the grain ripens. This rain helps to "swell" the grains and make them fine and large.

(c) A good or moderately good soil : wheat would die if planted in flat swampy fields like rice. The best land is gently waving or undulating land, where stagnant water cannot remain round the roots of the plant.

In different countries we find wheat is planted and reaped at different times in order to fit in with the climate, thus :

*Cool Temperate "winter wheat"* is planted about November (northern hemisphere), remains in the ground all the winter—it is better if the ground is covered with snow—grows during the spring, and ripens during the summer, so that it is cut about August or September. You see it takes nearly a whole year.

*Temperate "spring wheat"* is sown in the spring after the winter frosts and snows have gone, but is cut at the same time as the winter wheat.

*Tropical Climates (as India).*—The seed is sown in the latter part of the rains, and is ready for cutting in the early part of the hot season—January or February in India—but before the great heat commences. It is important that it should have a little moisture about the end of December in order to “swell the grain.”

You must remember that wheat is a *grass* which has been carefully cultivated by man. Like the natural grasses, it will flourish best in the Grassland Climates of the world. Just find where the temperate Grasslands occur. You will find these are the principal wheatlands of the world. Study the maps Figs. 80 and 93. Wheat also grows well in the drier parts of the Cool Temperate Oceanic Climate. The deciduous forests of these lands have been much cleared and wheat grown. England has this climate, but nearly all the wheat grows in the drier eastern part. Wheat flourishes in Mediterranean climates.

*Oats, Barley, and Rye.*—These are other important grains of temperate lands. They flourish where wheat flourishes, but will also grow in colder climates and poorer soils, and hence are found farther north in the northern hemisphere. Oats like a cooler and damper climate than wheat, barley will grow in a great variety of soils and climates, whilst rye will grow in the poorest soils and in climates too severe for wheat. But they all belong mainly to the temperate zone.

*Millets.*—Millets of different kinds are important grains in the Tropics, especially in India, where they grow with a very much smaller rainfall than rice. All over the drier parts of the Deccan they furnish the principal food grain of the people.

Sugar comes from two entirely different sources—the sugar-cane of hot wet countries, which you all know, and the sugar beet (which is a “root crop”) of temperate climates. All people must eat a certain amount of sugar in order to keep in good health. In some countries the people eat most of their sugar dissolved in tea. In India

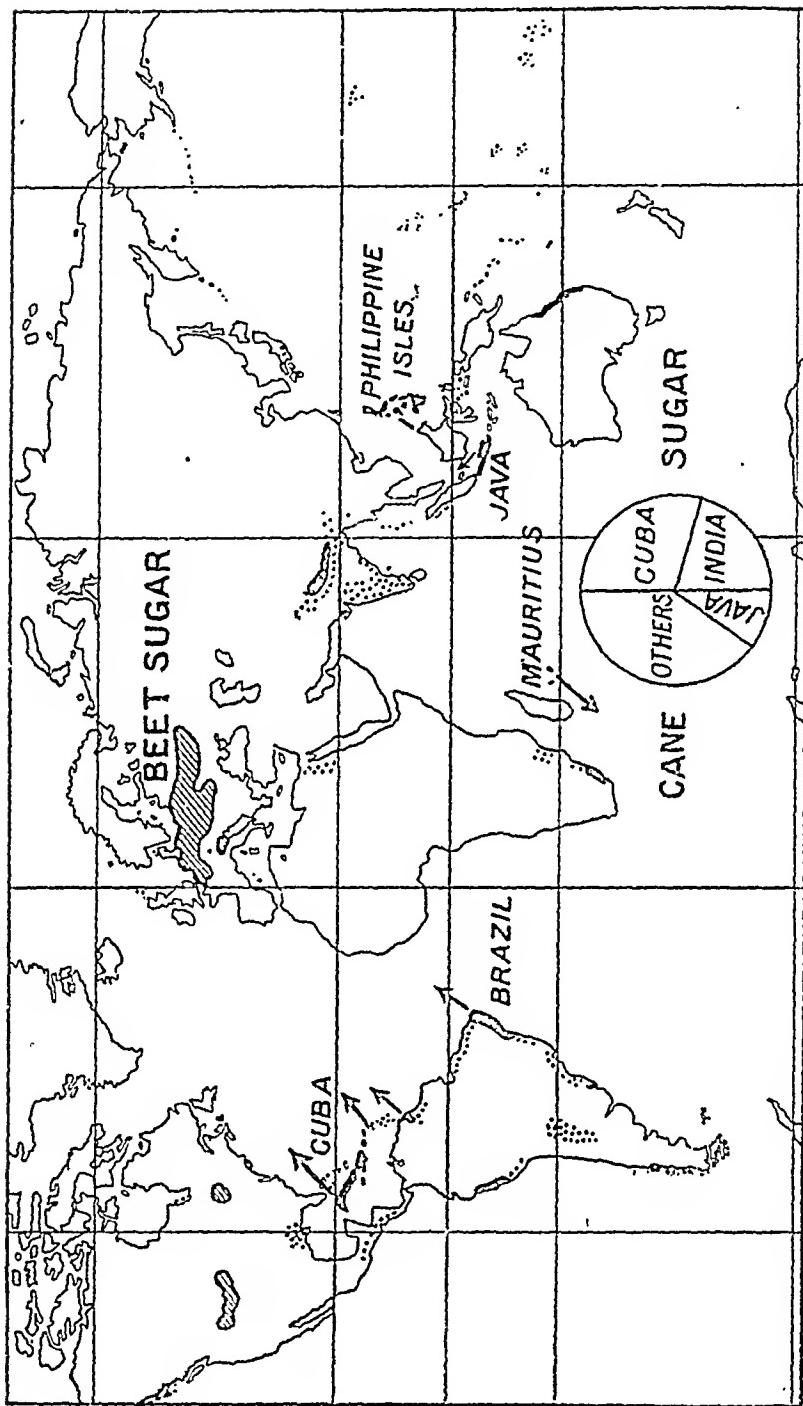


FIG. 90.—Sugar-producing regions of the world. The arrows show the exporting countries. The diagram at the bottom of the map is the total production of cane sugar.

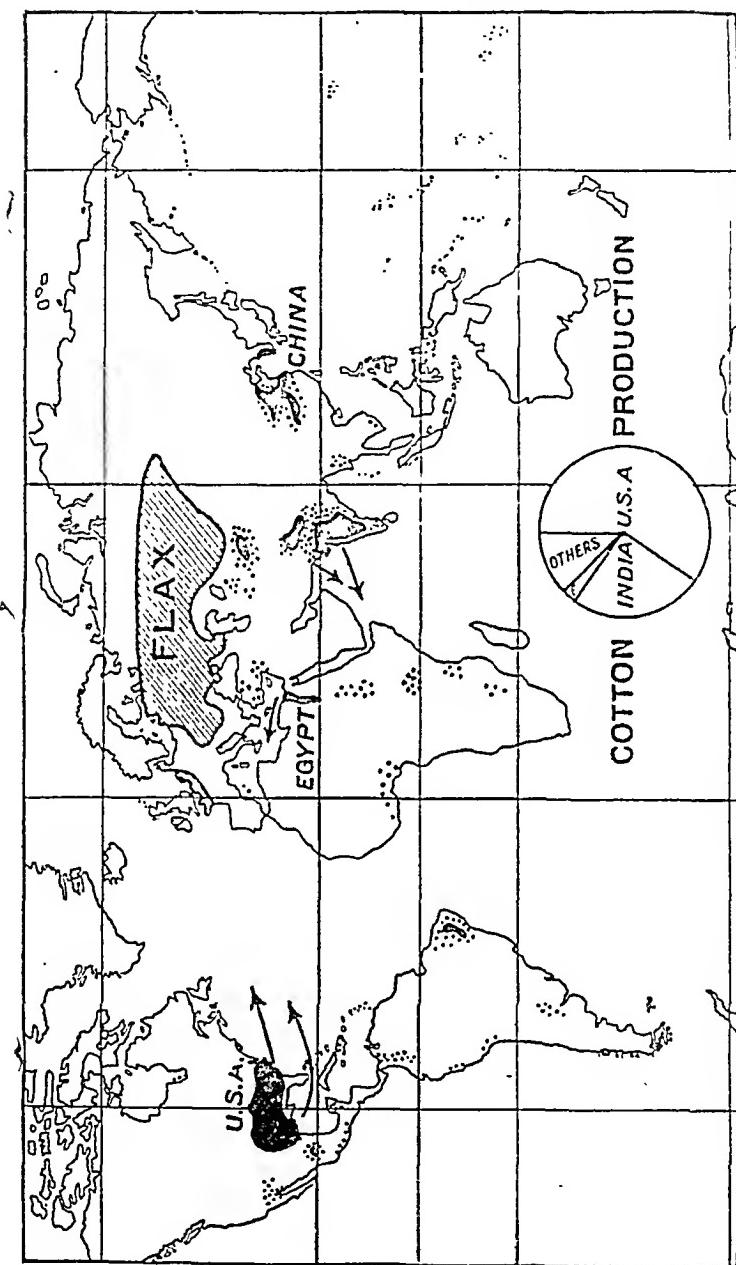


FIG. 97.—Cotton and flax producing regions of the world. The arrows show the countries which export raw cotton.

much sugar is eaten as jaggery made from the sweet juice of palm trees.

Tea is a very favourite drink in many temperate countries and many other parts of the world. Yet the countries which drink most tea cannot produce it themselves. Tea thrives with a monsoon type of climate, but must have well-drained soil, and so is usually grown on hill-slopes. We find the necessary conditions in Ceylon, Assam, and China.

Coffee also grows on slopes, but requires more heat than tea. It might be grown in many countries, but comes principally from Brazil, other South American countries, and Java.

Cocoa is a thick red-brown drink which is nice and warming in cold countries, although we do not use it in warm countries like India. It is obtained from the big beans of a tree growing in the Equatorial Climate on low lands—especially in the Gold Coast, South America, the West Indies, and a small island called Sao Thomé off the east coast of Africa. Chocolate is obtained from the same source.

**Mediterranean Fruits.**—There is a large variety of fruit trees which thrive in the Mediterranean Climate. You have learnt of some of them. The vine, whose fruits (grapes) are made into wine, is the most important. We find wine is produced in four of the five regions of the world where the Mediterranean Climate is found. Why is it not produced in North America? Another, the olive, furnishes olive oil, which is used by the peoples of southern Europe in the same way that we use coconut oil or ghi.

Cotton is a fibre obtained from the seeds of a plant which grows in the drier parts of monsoon lands, or in the Warm Temperate Oceanic Climate. Thus you find it growing in most of the countries which produce rice, but in the drier parts of them (see Fig. 97). Most comes from U.S.A.

Flax, from which linen is made, is the fibre of a plant grown in temperate climates. The same plant grows in

India, but it is grown there for the sake of its seeds (linseed), from which oil is obtained.

Jute, from which paddy-bags are made, is the fibre of a plant grown in the delta of the Ganges. Very little is grown elsewhere.

Rubber is obtained from the juice of several trees growing in the Equatorial Rain Forests. It is now mainly obtained from trees which have been planted in countries in or on the borders of the Equatorial Belt, such as Ceylon and the Malay Peninsula, but some is still obtained from the trees growing wild in the Amazon and Congo Basins.

### Mixed Farming

Mixed farming is very important in thickly populated countries like England. The farmers grow vegetables for the local markets, grow grain such as wheat or oats, keep cattle (for milk and butter as well as for meat) and sheep (for meat as well as for wool). There are several reasons why this is done. Firstly, there is the local market; the people in the neighbouring towns require a great variety of foods. But there is something more important than this. Each crop when it grows draws a certain amount of nourishment out of the ground. Different crops require different things. Thus if the farmer grows wheat in one field year after year the wheat will soon draw from the soil all the substances which wheat requires. As a result the crop gets poorer and poorer. If, instead of doing this, the farmer changes the crops every year he will get much better results. One year he can grow wheat, the next year vegetables, the third year some other crop. Or sometimes he can let natural grass grow for a time and let cattle or sheep feed on it. Changing the crops year by year is called "rotation of crops." A very usual plan is only to grow wheat every four years. It is very like a man who has a shop in which he sells silk goods, cotton goods, and woollen goods. If everybody who comes into the shop wants to buy cotton goods, the shopman will soon be sold out and will have only silk goods and woollen

goods left. If, however, the first person buys silk, the second cotton, and the third woollen, the whole stock will gradually be sold until it can be replaced. The soil is like a shop where there are a number of substances for sale. We must put into the ground firstly plants which require one substance, and then plants which require another.

There are two ways in which the whole supply of plant foods in the soil may be renewed. One is by allowing the soil to "rest" or, as we say, remain "fallow," when the agents of weathering cause changes in the soil and it recovers its supply of various plant foods. Or we may add animal manure—horse and cow dung is much used—or chemical manures. The nitrate manures from South America are much used in Europe. In thickly populated countries, where the ground is too valuable to be allowed to lie fallow even for one year, manuring is usual, but in huge grain farms, as in the open prairies of Canada, the ground is often allowed to lie fallow. The system of manuring and rotation of crops is called "intensive cultivation." The yield is very good in such cases. For example, in England and Denmark the farmers get 35 bushels of wheat from every acre sown, but in Canada or the Argentine, where enormous areas are covered, the yield is only 10 or 12 bushels per acre. Mixed farming is carried on especially in the countries of North-Western Europe and North-Eastern United States.

### Stock Farming

**Cattle.**—In India we are accustomed to think of cattle being kept principally to draw carts along the roads and streets, or for ploughing. The cows are not nearly so valuable as the bullocks. Some of the people eat the meat and a few people drink the milk, but meat and milk are not important articles of food when compared with rice.

In other countries it is quite different. In Europe and America cattle are practically never used for ploughing

or for pulling carts. Big strong horses do the ploughing and smaller horses draw carts. In such countries, too, there are good roads and railways everywhere, so that motors and trains are used much more. In thickly populated countries where mixed farming is carried on, cattle are kept for two purposes. The cows (which are more valuable than the bullocks) are kept for the sake of their milk. People in Northern Europe and a large part of North America use an enormous quantity of milk. From the cream of the milk butter and cheese are made. Keeping cattle for the sake of the milk, butter, and cheese is called *dairy farming*. The bullocks are usually killed when quite young for the sake of their flesh.

Cattle thrive best where there are fine rich grasslands, and we find them living on the cooler parts of Tropical grassland and the wetter parts of Temperate grassland. Where, as in Canada, Argentine, and part of Australia, there are enormous areas of suitable grassland cattle are kept in great numbers, and here it is mainly for the sake of their flesh. White peoples eat huge quantities of beef—the flesh of cattle. It is now possible to send meat from one part of the world to another by freezing it. Thus a great proportion of the meat eaten in Europe is sent right across the equator from the Argentine, but in a frozen state. In all countries where cattle are kept, the skins or "hides" of the animals are important. From them leather is obtained.

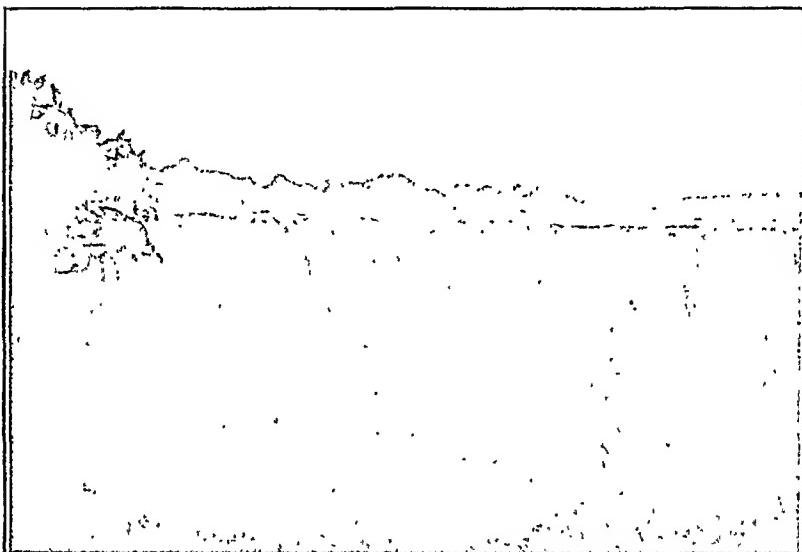
Good grass for cattle grows under similar conditions to those required by wheat, and in many countries we find cattle rearing is being given up for wheat farming.

**Sheep.**—Like cattle, sheep are kept for more than one purpose. They may be kept for the sake of their wool (from which clothing is made) or for their flesh (called mutton). The sheep which yield the best wool do not always yield the best mutton, and the animals have to be fed according to whether the wool is required or the flesh.

Sheep do not require such good grass as cattle, and are

found in poorer, drier regions. Thus in any grassland country we usually find cattle in the damper parts and sheep in the drier, but both are found in the same country. Thus in England cattle and oats thrive on the west (wet side of the country); sheep and wheat on the dry eastern side.

**Goats.**—Goats can live on still poorer grass and in all



[Photo: L. D. Stamp.]

FIG. 98.—Victoria Falls (the main falls), Rhodesia. A great potential source of power, which has not yet been used by man.

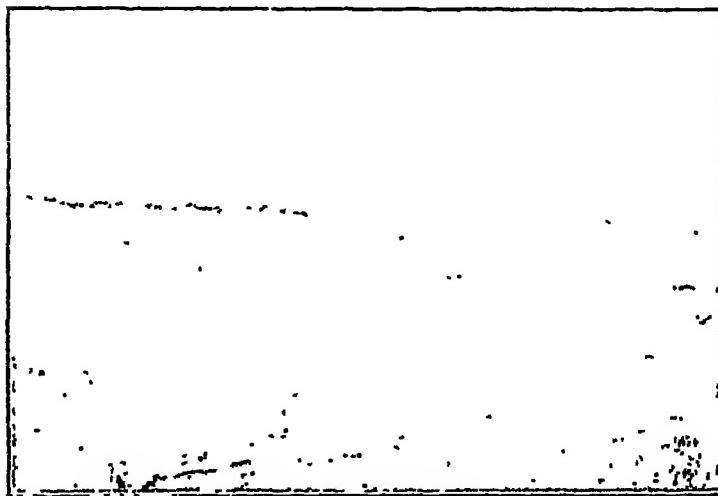
sorts of climates. Notice the herds of goats kept in all the drier parts of India. Their milk is used and also their flesh, but they are not nearly so important as sheep.

### Mining

Mining is an important occupation in most civilised countries.

**Mining for Metals.**—The ores of metals are found in old hard rocks, often in mountain regions, which are far

from towns and cultivated lands. Mining towns and villages spring up in isolated places, and in small mines the miners may lead a very lonely hard life. One of the biggest mines in India or Burma is at Bawdwin in the Northern Shan States. It is surrounded by jungle for miles and miles in every direction, and if it were not for the valuable lead and silver ores the country would not be used at all.



[Photo: L. D. Stamp.]

FIG. 99.—Niagara Falls. Here the great fall of water has already been used by man to generate electricity.

Yet a big town has sprung up, and a special railway 40 miles long connects it with the ordinary line.

**Coal Mining.**—Coal, as you have learnt, is always found in sedimentary rocks, and so in flatter, less mountainous country than most metals. Coal is used as a fuel for factories in a large number of industries, and it is often best to build the factories near the supply of coal. So we find most coalfields become thickly populated manufacturing areas.

**Oil Mining.**—Oil is found in young soft sedimentary

rocks, and so usually in low lands and in very many parts of the world. Oil is obtained by drilling holes in the ground, and the oil either rushes up or is pumped up. The oil when obtained can be pumped through pipes for great distances, and so easily taken to places where it is required. Many pipe lines from oilfields are hundreds of miles long. Much oil is burnt by ships, and so it is pumped to some port where it can be used directly by oil-burning steamers. Some oilfields are in busy industrial centres, but others are situated far away in the deserts.

**Quarrying.**—Stone for building, limestone for making lime and cement, some coals and many iron ores are obtained by quarrying and not by mining. The difference is that in quarrying we cut away the surface of the earth and so make a large hole (quarry); in mining a long tunnel or a deep shaft is made before we reach the coal or metal we require, which may be buried deep down. Salt, too, is often quarried, and in some countries (Chili) salts called nitrates are obtained from the surface of the deserts.

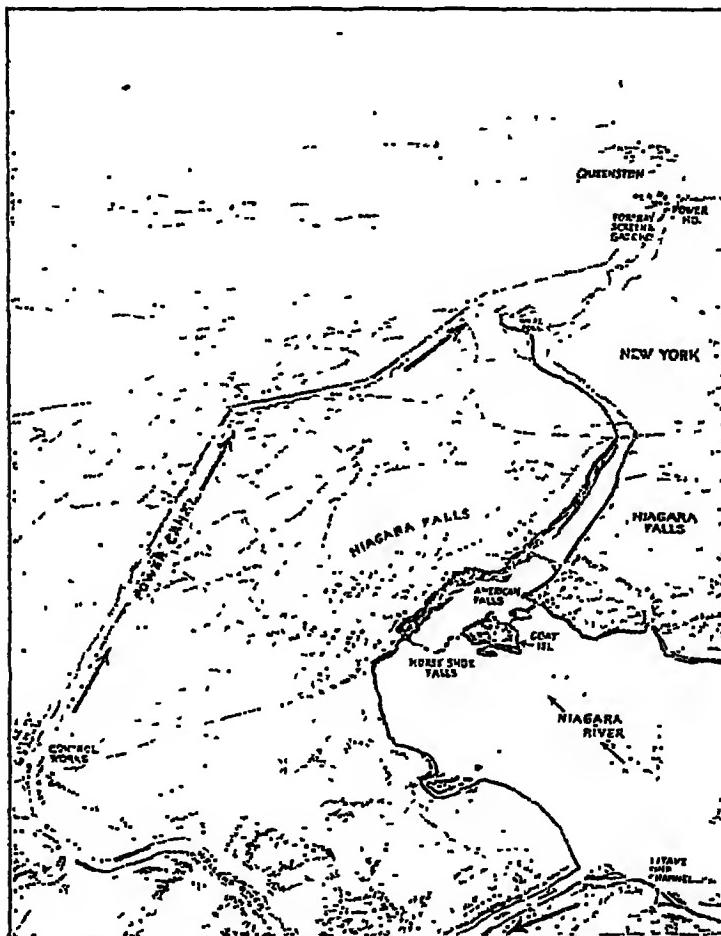
### INDUSTRIAL OCCUPATIONS

In the old days nearly all articles were made slowly by hand, and it required a very large number of people to make only a few things. Cloth, silk, pottery, metal articles were all made in small quantities by hand. But a great change has taken place in the world during the past century. The change is so great that it is often referred to as the "Industrial Revolution." In a country like India we find industrial occupations are carried on in two very different ways :

(a) At certain large centres, such as around Bombay and Calcutta, goods are manufactured by machinery in big factories and large quantities are produced.

(b) In nearly all the villages the old industries such as the spinning of cotton into threads and the weaving of cotton for clothes, making of pottery, etc., is still carried

on as it has been for hundreds of years, "by hand." Such existing industries are often called "village industries."



[Courtesy of the Hydro-Electric Power Commission of Ontario.]

FIG. 100.—Diagrammatic bird's-eye view of the great Queenston-Chippawa power development on the Niagara river, the largest power development in the world. The arrows show how the water is taken in above the falls and right down to the Power House, Queenston.

In other countries it is quite different. In the United States, British Isles, France, Belgium, Germany, and the other industrial countries nearly everything is done by machinery ; manufacture by hand has practically disappeared, as it will do one day in India.

A very large number of people are employed in industrial occupations, and there is a great variety of work for them to do. We must have "skilled workmen" to do the important work ; "unskilled workmen" who correspond in many ways to the coolies in India. Then we must have clerks to keep accounts and do office work. Then there are salesmen and shopkeepers who sell the goods.

### INDUSTRIAL CENTRES

Why have the Industrial Centres grown where they are ?

We must now notice the causes which give rise to the foundation of great industrial centres. We should have :

(a) Power to drive the machinery. We can use either coal or oil or water power. Very often we use the coal or water power to generate electricity by which the machinery is worked. We find many industrial regions situated on coalfields or near great waterfalls whose water has been "harnessed" to do work. Oil can be pumped great distances, and so it is more easily brought to a place. Electricity also can be carried along wires for considerable distances, so that the electricity can be made in one place and carried to work machinery a great distance away.

(b) A supply of raw material.

(c) A thick population to purchase the goods and supply the necessary labour.

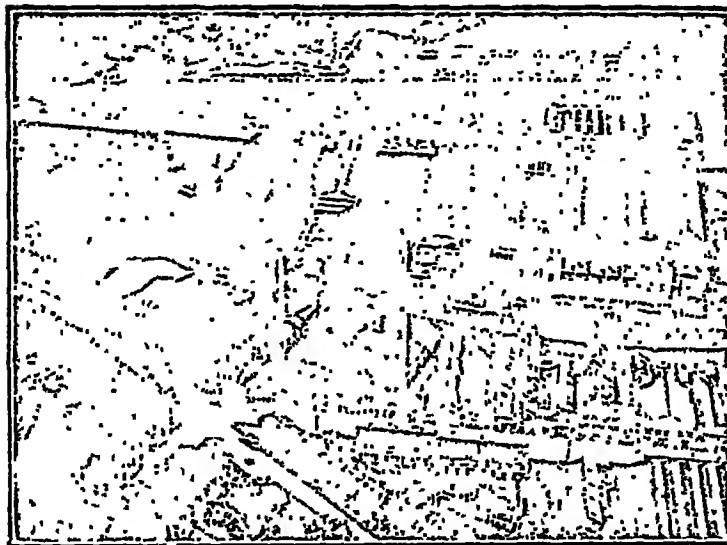
(d) Good communications—railways, canals, or steamship routes to carry the goods to distant parts or to bring the raw material in.

(e) Climate should be good, and sometimes climate is

important in actual manufacture. The dampness of the air in Lancashire (England) is exactly suited to the manufacture of cotton.

(f) A good supply of water is usually required.

It is almost impossible to have *all* these conditions in one place, so we must choose the places which have *most* advantages.



[Photo : Central Aerophoto Co., Ltd.]

FIG. 101.—An industrial town from the air.

Notice the factory and the way in which it is reached by railway, canal, and roads. Notice the workmen's houses surrounding it.

### COMMERCE OR TRADE

We have said that trade in its simplest form is an exchange of food for manufactured goods. Thus we find industrial countries like England and Germany buy food but sell manufactures. In India—a country mainly agricultural—we sell food and raw material (such as cotton and jute), but buy manufactures which we cannot yet make

ourselves. The goods sold by a country are called its exports ; the goods purchased by a country are called its imports. The buying and selling and all that is connected therewith is Commerce.

#### TRANSPORT AND COMMUNICATIONS

We cannot buy and sell goods without carrying them from one place to another. Even in the bazaar all the things have to be taken there before they can be sold and brought away. In a large country goods have to be brought from one part of the country to another. In the commerce between different countries the goods have to be brought from one country to the other. This carrying of goods is called transport, and the lines of transport are called the communications.

**Transport by Land.**—By far the most important means of transport in civilised countries is by railway. In some flat countries rivers and canals are much used, and transport on roads by motors may be important for short distances. In countries like India, where railways and roads by no means reach every part, many of the old methods of transport still prevail. These methods vary with the country. In the frozen north reindeer or dogs drag sledges over the snow. In mountainous countries mules are most important ; in India elephants are often used over hilly tracts with no roads. In deserts camel caravans alone can be used, because the camels can go long periods without water and their broad feet do not sink into the sand. In the jungles of Africa coolies are used. Where rough tracks have been made, as over most of India, bullock carts are used, or water buffalo in wetter regions. All these means of transport are slow compared with the railway, and the loads carried are small.

**Transport by Rivers and Canals.**—Goods can be carried very cheaply by water. In many cases only the original cost of the boat and the wages of the boatmen have to be considered, for the boat itself can be carried along by

the wind. When steamers are used we must remember that one ton of coal burnt on a steamer will drag a load nearly twenty times as heavy as a train on land burning the same amount of coal. On some canals in Europe horses walk along the shore and drag a heavy boat. In this country three or four coolies do the same thing. They are able to pull a boat with a load weighing 40 tons, but on land they would only be able to drag a cart containing two tons. So transport by water is cheap, but it is slow. If we have rivers going in the direction required, river



FIG. 102.—Camel transport in the dry north-west of India. The camels are laden with bales of cotton.

transport is most important (as it is on the Irrawaddy and used to be on the Ganges). We can only use rivers which have no rapids, waterfalls, or dangerous currents. If, on the other hand, it is necessary to cut canals, that is very expensive, and ships passing through must pay "dues." Canals are very useful to join one river system to another. We shall speak later about the very important ship canals like the Suez and Panama Canals.

**Transport by Railway.**—Railways have many advantages. They carry goods very quickly, and they can be constructed in almost any direction—except in very

mountainous countries where the cost becomes very great. Transport by railway is more expensive than by water, because it costs a great deal to build the railway, and the engines, trucks, etc., are all expensive. Then railways burn much coal and many men have to be employed to look after them.

Railways in India are of different sizes, and we measure their size by the distance between the two rails which we call the "gauge." In India we have two important gauges:

(1) The broad gauge—when the two rails are 5 feet 6 inches apart.

(2) The metre gauge—when the rails are 1 metre or 3 feet 3½ inches apart.

Broad-gauge trains are much larger, can travel much more rapidly, and carry more goods, but they are expensive to build and cannot be built round sharp curves. Metre-gauge trains are smaller and slower, but are more easily built in mountainous countries, as they can be taken round quite sharp corners and curves.

In other parts of the world, such as most of Europe and North America, the standard gauge is used, where the rails are 4 feet 8½ inches apart. This is perhaps the best for all purposes. The biggest and fastest trains in the world, travelling at an average of nearly 60 miles an hour, are on this gauge.

**Transport by Sea.**—Commerce between countries is carried on largely by means of steamers. You may think that ships can go anywhere on the ocean. So they can, except where the water is very shallow. But we find that most ships always go along definite lines, which we call "ocean highways" and "ocean trade routes." In other parts of the ocean it is often a very rare sight to see a steamer at all. Why should steamers usually use definite routes in this way? It is because the ocean trade routes are well known, there are good maps, and no fear of the ship striking against small islands or rocks which have not been discovered before. Dangerous places are carefully marked by lighthouses and lightships. At

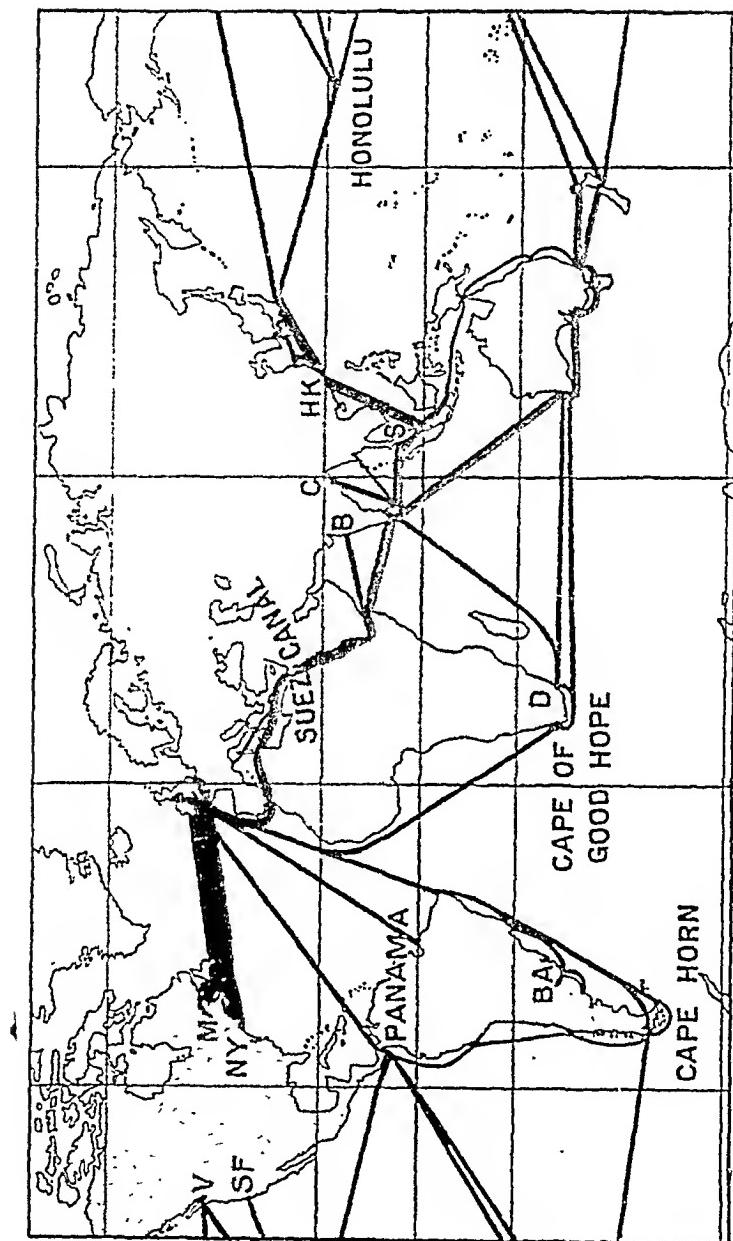


FIG. 103.—Ocean trade routes.

intervals there are "coaling stations," where ships may obtain coal and oil and other things they may require. If a ship is damaged there will be others using the same highway which can quickly come and help.

Let us now look at the principal ocean trade routes of the world.

(a) *The North Atlantic Routes*—from the busy countries of Europe across to the eastern coast of America. This is the busiest route in the world and has the largest ships. In the cold season there are dangerous icebergs near the American coast—brought by the Cold Labrador Current—and to avoid these the route is farther south in this season.

(b) *The Suez Canal Route*—from the countries of Europe through the Mediterranean Sea to the Suez Canal. The Suez Canal is about 100 miles long and was opened in 1870. It has made an enormous difference to the trade routes of the world, and the Suez Route is now the second busiest. The very largest ships cannot pass through, so we in India do not see such huge steamers as those which cross the Atlantic. From the Suez Canal the route runs down the Red Sea and there divides, one branch going direct to Bombay, the other route to Colombo. At Colombo it again divides, one route going to Madras and Caleutta, one to Rangoon, one to Singapore, China and Japan, and one to Australia.

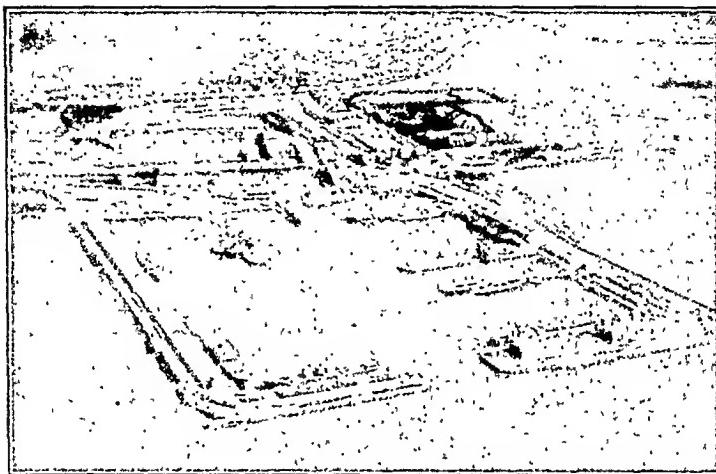
(c) *The Cape Route*.—It costs a great deal to keep up the Suez Canal, and each ship has to pay a great deal to go through. Some ships find it cheaper to follow the old route round the Cape of Good Hope—this route runs from Europe to South Africa, and other branches go to Australia and India.

(d) *Panama Canal Route*.—The Panama Canal has made the Pacific coast of North and South America very much more easily reached from both the eastern coast of North America and from Europe.

(e) *South Atlantic Routes*—from Europe to South America—are less important; but much meat and wheat are sent from Argentina to Europe.

(f) *Pacific Routes.*—There are two main series of routes across the Pacific : one which goes direct from Japan to Vancouver or San Francisco ; the other which uses the island of Hawaii (with its port Honolulu) in the centre of the Pacific as a calling station.

In the old days ocean routes depended largely on the winds, but there are now few sailing ships and winds are less important. Even the biggest steamers fear icebergs and cyclones, and try to avoid both.



[Photo : South African Railways Publicity Dept]

FIG. 104.—Cape Town docks from the air.

A good example of an artificial harbour. Find the ship being repaired in dry dock.

**Ports.**—At the ends of the great trade routes are the great ports—centres of the world's trade. A port should have :

- (a) A good harbour for the ships.
- (b) Good communication with a fertile or thickly populated region behind it. The region behind a port, whose products are naturally sent to the port for despatch to other countries, is called its “Hinterland.”

Many ports are at the mouths of great rivers, and the

basins of the rivers form their "hinterlands." Calcutta is an example, Rangoon another. Some ports have fine natural bays which serve as harbours. San Francisco and Sydney are examples, and to some extent Bombay too. Other ports have artificial harbours built of stones. Madras and Colombo are examples. Some ports have no hinterlands, but they are needed as ports of call or coaling-stations. Aden is an example.

#### THE RACES OF MANKIND

We have now studied the occupations of man, but have said very little about the different races of mankind. In old geography books you will find mankind divided into three races—the White, Yellow, and Black. But that was not a very good division, because the "White" or Caucasian Race includes nearly all the brown-skinned people of India. It is probable, too, that colour of the skin depends largely on exposure to the sun. An Englishman in the tropics often becomes "tanned"—his skin becomes a dark brown. His children, even though they are born in the tropics, are pale-skinned, but it is probable that if the white man lived for many generations in the tropics his skin would become much darker. We do find, indeed, that the people of the south of Europe, such as the Italians, have a darker skin than those living in the north of Europe, where it is colder and there is less sun.

We can divide the races of mankind into three groups by their hair. There are :

(1) People with straight hair. If we look at a section of their hair under the microscope we find that the section is circular. These people often have yellowish skins and broad, flat faces. We may call them also "Mongolians." Some of them, like the Chinese, have curious almond-shaped eyes set obliquely. Most of the inhabitants of Burma are Mongolians, and so are some of the hill tribes of the Himalayas. The American Indians who used to inhabit most of America have a coppery-red skin and

straight hair, but they have larger noses than the normal Mongolians. The typical straight-haired peoples are the Chinese and Japanese.

(2) People with wavy hair. A section of their hair under the microscope is an oval. The wavy-haired peoples constitute the Indo-European division of mankind,

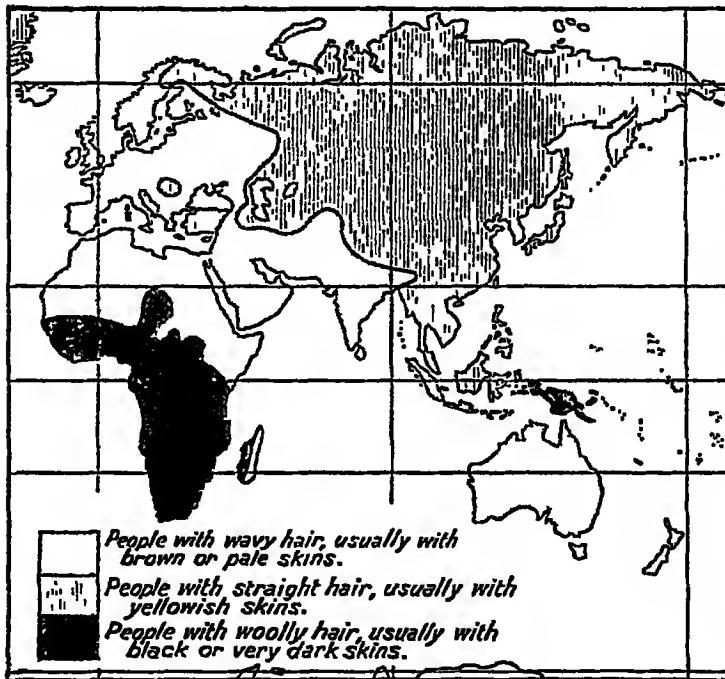


FIG. 103.—Peoples of the world.

America is not shown because it is mainly inhabited by people who have left Europe and settled there during the last 300 years. There are now very few "American Indians" who had straight hair.

including most of the inhabitants of Europe and India. Their skin varies from almost white to dark brown. They usually have narrower faces than the Mongolians, and their noses are more pronounced.

(3) People with curly or woolly hair—hair which forms into tight curls all over their heads. Under the micro-

scope their hair is seen to be flattened. The negroes belong to this group. They usually have very dark skins, almost black.

You will learn more about the races of mankind when we deal with the separate continents.

#### QUESTIONS AND EXERCISES

1. What are the physical features, climate, and natural vegetation around your home? Mention all the ways in which your life is controlled by them.
2. Draw diagrams to show the cause of the rainfall in equatorial regions.
3. What do you understand by the term "climatic control"?
4. Give a general account of the chief wind systems of the earth.
5. How is rainfall measured? Draw a sketch-map expressing the annual rainfall of any country you know.
6. What connection is there between pressure and winds? Illustrate your answer by two sketch-maps showing the general arrangement of the pressure belts of the world during January and July and the resultant winds.
7. What is the meaning of "temperature"? What causes the differences in temperature (a) in a certain place at different times of the year; (b) in different places at the same time?
8. What is the difference between the two terms "climate" and "weather"? Give examples of each.
9. Show by means of sketch-maps how (a) temperature, (b) rainfall, have affected the natural vegetation of the earth.
10. Compare and contrast the equatorial and coniferous forests, dealing especially with the climatic conditions which have given rise to each.
11. What are the chief occupations of people who live in (a) steppes, (b) mountains, (c) savanna land, (d) deciduous forests? Show how the geographical and climatic conditions have decided these occupations in each case.
12. Write an account of the meat trade of the world.
13. What climatic and geographical conditions are necessary for the growth of (a) rice, (b) wheat, (c) millet, (d) cotton, (e) maize?
14. What is an "industrial region"? Give a description of what you would expect to find in such a region.
15. Of what use to mankind are deserts? Show how deserts have formed boundaries between nations. Give examples.
16. Give a brief account of the world's production of woollen goods. Include in your answer the origin of the raw material, the places where this raw material is found, the industrial regions to which it is taken, and the process of manufacture.

## PART II

# REGIONAL GEOGRAPHY

### A. ASIA

#### 1. POSITION AND EXTENT

ASIA is the largest of all the continents and comprises nearly one-third of the land of the globe. With the exception of some of the islands of the East Indies, it is situated entirely in the Northern Hemisphere. It stretches from the frozen shores of the Arctic Ocean, far inside the Arctic Circle, into the Tropics, and the southernmost part of the mainland near Singapore nearly reaches the equator. From west to east it stretches from 25° E. to 170° E.—that is, around more than one-third of the Earth's circumference. Some parts of Central Asia are more than 1500 miles from the sea. Notice carefully on the map where the Arctic Circle cuts across the continent and where the Tropic of Cancer lies. Running through the centre of the continent is the longitude of 90°. These lines will help to fix the position of Asia in your mind.

#### 2. PHYSICAL FEATURES

We can divide the great continent of Asia, according to its structure or physical features, into four big divisions. Study carefully Fig. 107, where this division has been made. Note—

- (1) *The Northern Lowlands*, forming a great triangle of low land bordered on the north by the Arctic Ocean. This great area of lowland, comprising most of Siberia, is only separated from the Great

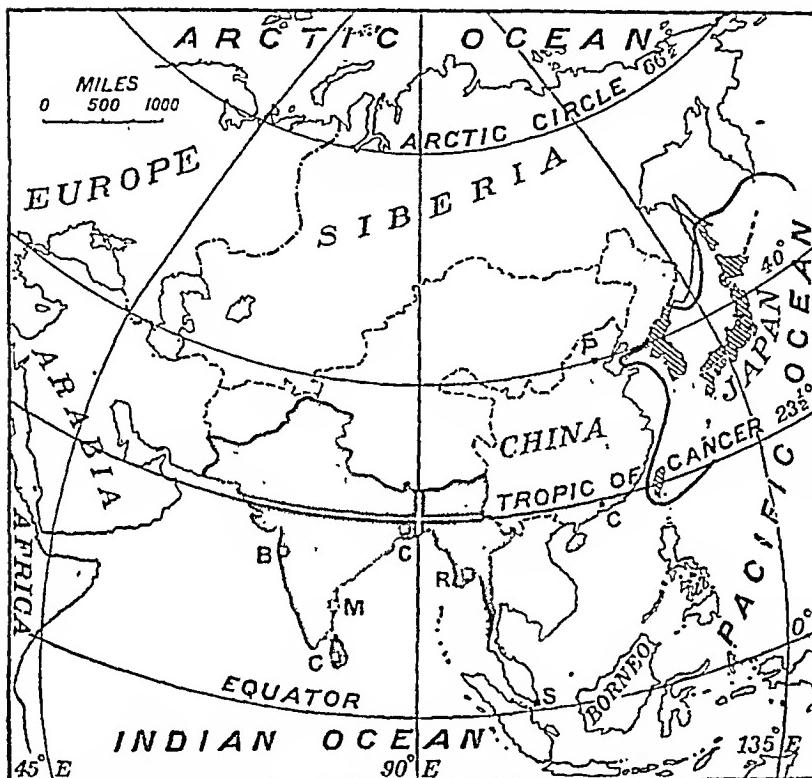


FIG. 106.—The position and size of Asia.

Notice very carefully the position of the Tropic of Cancer, the countries through which it passes and the large towns which lie near it. Notice how the Arctic Circle passes right through the north of Asia. Notice also the line of 90° E. longitude passing through the Ganges Delta and through the centre of Asia. When you draw a sketch-map of Asia put these lines in first, and you will easily be able to remember the outline of the continent. On this map measure the distance of the centre of Asia from the sea.

European Plain by the low range of the Ural Mountains.

- (2) *The central triangle of Young Folded Mountains* and the plateaux which they enclose. This is a great area of highlands and mountains forming

a triangle in the centre of Asia. There is a big extension from the triangle running westwards and ending in Asia Minor, and there are other extensions—lines of folded mountains running away to the south-east and forming some of the ranges of Indo-China and the East Indies.

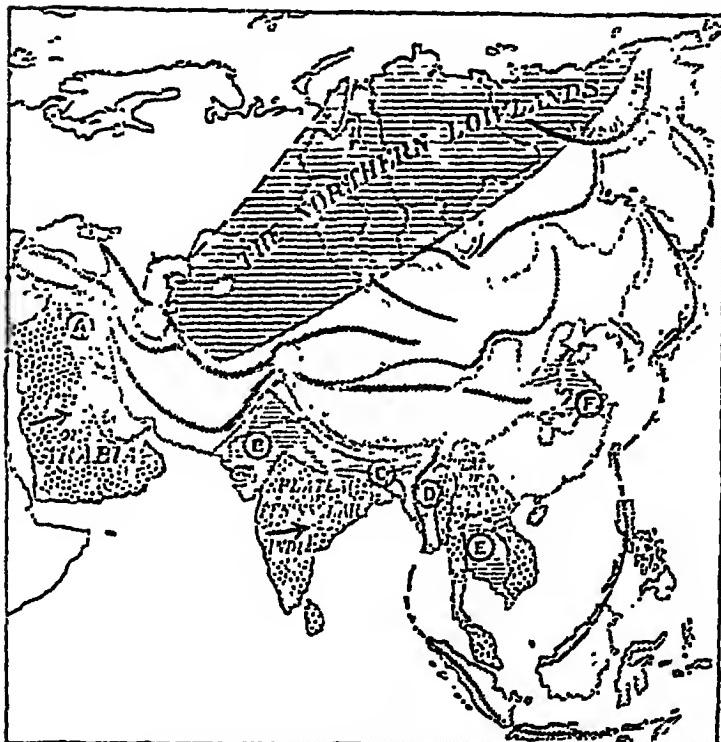


FIG. 107.—The main physical features of Asia.

- (3) *The Old Plateaux of the South*, formed of very old, hard crystalline rocks. There are three big masses : (a) the Plateau of Arabia ; (b) the Plateau of Peninsular India ; and (c) the Plateau of Yunnan and Indo-China.

(4) *The Great River Valleys*, found between the old plateaux and the fold mountains. There are the basins of the Tigris and Euphrates, the Indus, and the Ganges-Brahmaputra.

Let us now study each of these physical divisions in order.

(1) *The Northern Lowlands*.—This great plain is formed of the basins of the Ob, Yenesei, and Lena. In the south-west is a small area of inland drainage, draining into the Sea of Aral. The three great rivers are very long

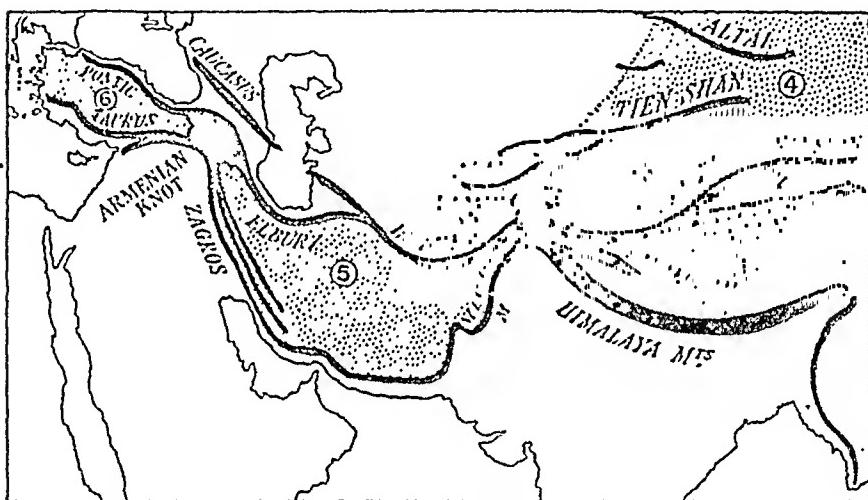


FIG. 108.—Key to the mountain ranges shown on Fig. 107.

and very slow, for the slope down to the Arctic Ocean is very gradual. The rivers flow towards the very cold north, and their lower courses are frozen for many months of the year. When this happens the water from the upper courses cannot escape to the sea, but spreads over the land and forms great swamps.

(2) *The Central Mountainous Triangle*.—To understand the numerous mountain ranges let us start from the Pamir Knot. (Follow these in Figs. 107 and 108.) From this region mountain ranges radiate in nearly all directions.

To the west there are two main ranges: one running south-west as the Sulaiman Mountains, and then along the coast of Persia, continuing as the Zagros system into Asia Minor, where it forms a Knot—the Armenian Knot—and then turning along the southern coast of Asia Minor; the other branch runs westwards as the Hindu Kush, along the north of Persia, the shores of the Caspian Sea (Elbruz Mountains), and along the northern coast of Asia Minor. Just where this line enters Asia Minor it joins up with the southern line of mountains to form the Armenian Knot. A branch of this northern line forms the Caucasus Mountains.

Running eastwards from the Panir Knot there are four main lines. The most southerly is the greatest range in the world—the Himalayas. Further north are the two ranges, close together, of the Kunlun and Altyn Mountains, and still further north are the Tien Shan Mountains running in a north-easterly direction. The last-mentioned line continues right across Asia, forming the boundary with the Northern Lowlands, but it consists of a number of ranges, such as the Altai Mountains and the Yablonoi Mountains, which cross the main line and run from east to west.

There are two other groups of new fold mountains we must consider now.

(a) Running roughly southwards from the eastern end of the Himalayas is a big fold which passes through Burma as the Arakan Yomas, continues through the Andaman and Nicobar Islands to Sumatra and Java, and other islands of the East Indies.

(b) Forming "festoons" or loops down the east coast of Asia are the mountain chains which form the Kurile Islands, the Japanese Islands, etc. On the mainland are other mountain loops such as the Stanovoi and Verkoyansk ranges.

Between the great lines of fold mountains are the plateaux; many of them are nearly level plains, surrounded by the ring of mountains and forming areas of inland

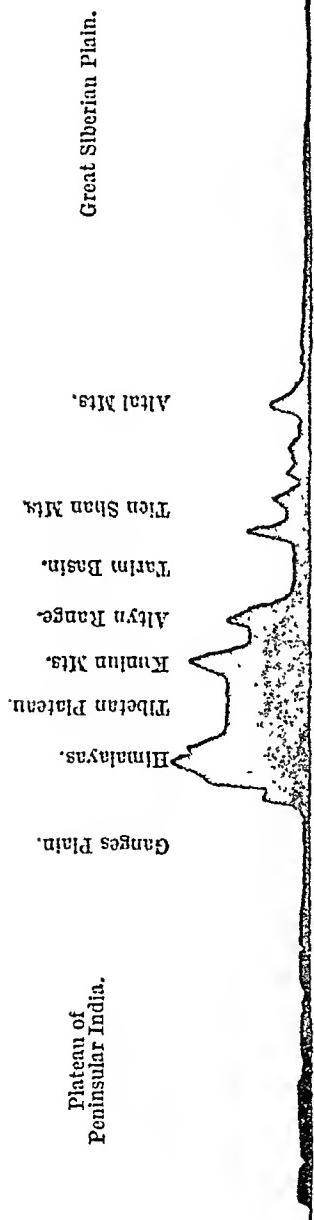


FIG. 109.—Diagrammatic section across Asia from south to north: from Cape Comorin in India to Cape Chelyuskin in Siberia.

drainage. They are marked by these numbers on Fig. 108.

(1) The plateau of Tibet, or the "Roof of the World," is the highest plateau in the world—more than 12,000 feet above sea-level. It lies between the Himalaya Mountains on the south and the Kunlun on the north.

(2) There is a small basin slightly lower, between the Kunlun and Altyn ranges. It is largely occupied by a swamp.

(3) The Tarim Basin is an important area lying between the Altyn Mountains and the Tien Shan. It is a dry region, but all the water drains inwards into a small lake.

(4) The Desert of Gobi, or Shamo, forms an enormous plateau south of the Altai and Yablonoi Mountains and northeast of the Altyn Mountains.

(5) The plateau of Iran, occupying most of Persia, lies between the northern and southern ranges which run westwards from the Pamir Knot. The ranges join up again as the Armenian Knot.

(6) The plateau of Asia Minor west of the Armenian Knot, between the Black Sea and the Mediterranean.

It is difficult to remember

all these mountains and plateaux unless you study and remember Figs. 107 and 108. Notice that a number of great rivers drain eastwards from the mountain triangle to the Pacific Ocean. The largest are the Amur, Hwang Ho, and Yangtze Kiang.

(3) **The Old Plateaux of the South.**—(a) Arabia is a great plateau of old, hard rocks, which shows a steep edge to the Red Sea on the west and slopes gradually to the east till it passes into the Tigris Valley. The slope is very gradual and not much broken up, for the country is dry and there are few rivers.

(b) The plateau of Peninsular India also slopes from west to east. The steep western edge we call the Western Ghats, the low eastern edge is the Eastern Ghats. This plateau is much cut up by rivers like the Mahanadi and Godavari.

(c) The plateau of Yunnan and Indo-China stretches from the Shan States in Burma eastwards. A long branch of old rocks runs down into the Malay Peninsula. This plateau is also much broken up by rivers, such as the Salween, Mekong, and Yangtze.

(4) **The Great River Valleys.**—These are fertile areas of lowland with vast stretches of alluvial soil. Note their position on the map (Fig. 107)—the Tigris and Euphrates Basin (A), the Indus Basin (B), the Ganges-Brahmaputra Basin (c), the Irrawaddy Basin (d), the Mekong Basin (E), and the Yangtze Basin (F).

Before we leave this section study Fig. 109, which is a section across Asia from south to north. In the south, notice the low tableland of Peninsular India; then the broad, flat plain of the Ganges; and then the sudden rise to the enormously high Himalaya Mountains. To the north of the Himalaya Mountains there is a gradual descent to the Arctic Ocean by means of a series of "steps" or terraces. The plateau of Tibet is the highest step; as we go to the north the steps become gradually lower till we reach the great Northern Plain.

### 3. CLIMATE

In the early part of this book you learnt that places a long way from the sea often suffer from great extremes of climate—that is, they are very hot at one season and very

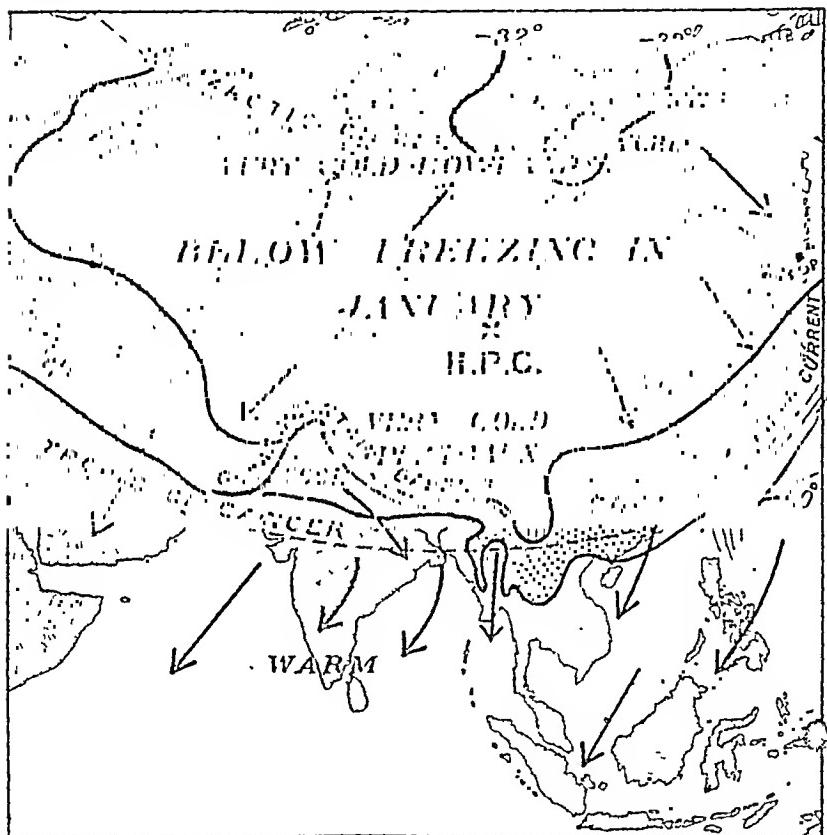


FIG. 110.—Conditions in the cold season showing January temperatures and winds.

Notice that the whole of Asia north of the great Himalayan mountain barrier is freezing in January. Notice the cold, dry winds blowing outwards from Central Asia; they make China and Persia cold, but are little felt in India. The warm Japan current keeps Japan warm.

cold at another. In the centre of Asia it is possible to get a very long way from the sea indeed, and Asia, more than any other continent, suffers from great extremes of

climate. In Asia are to be found some of the coldest lands in the world, as well as some of the hottest.

**Conditions in the Cold Season.**—In our cold season the sun is shining vertically over the Tropic of Capricorn,

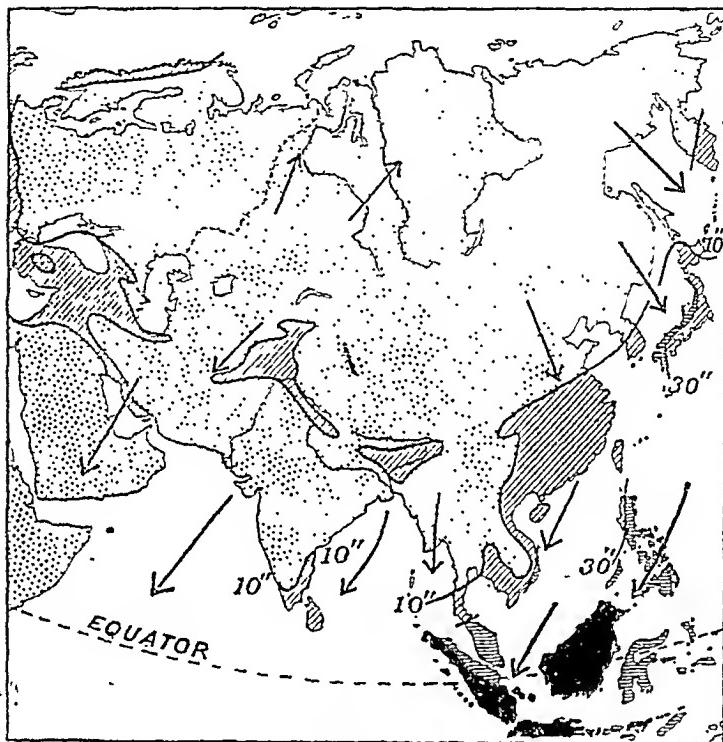


FIG. 111.—Conditions in the cold season—Rainfall from November 1st to April 30th.

The cold winds bring very little rain except after they have crossed the sea. The rainfall lines marked are 10, 30 and 60 inches. Regions with more than 60 inches shown in black.

far to the south of Asia. The centre and north of Asia become extremely cold. There are two reasons why these parts of Asia should be colder than either Europe or North America. The centre of Asia, we have learnt, is formed of an enormous mass of high mountains and

plateaux. You know that the air on the mountains becomes very cold indeed, and so there is an enormous mass of very cold air all over the centre of Asia. The north of Asia is very cold, because it is not only a long way

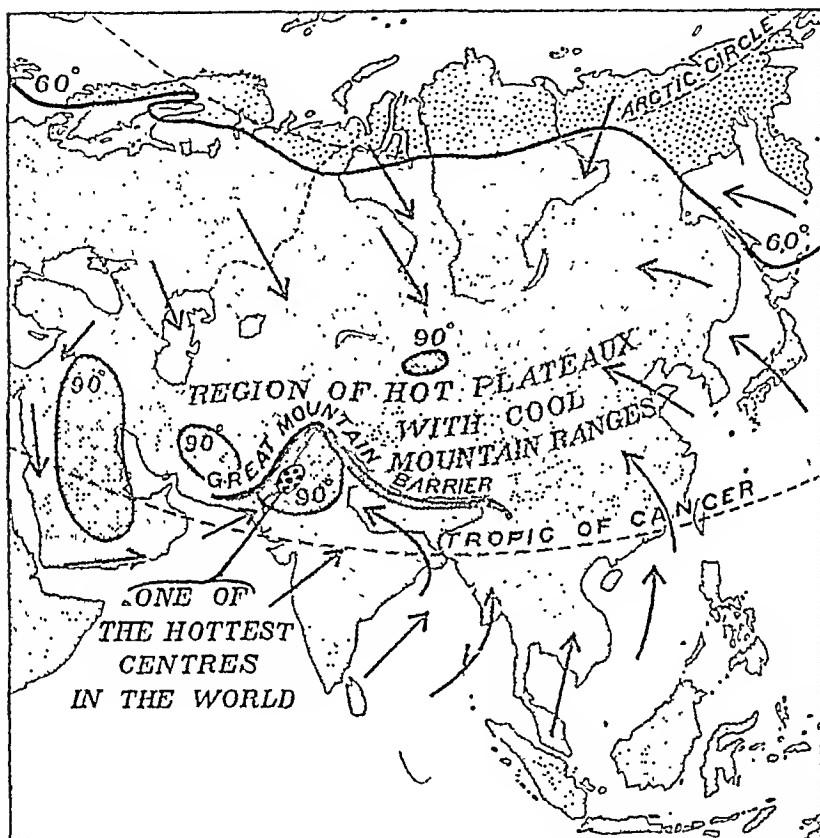


FIG. 112.—Conditions in the hot season showing July temperatures and winds.

The sun is shining vertically over the Tropic of Cancer and large areas get very hot. The cool, rain-bearing winds are blowing inwards towards the low pressure centres lying over the hot areas.

from where the sun is shining vertically, but it is also cut off from the warm lands of the south by high mountains, and no warm currents of air can reach it.

But cold air is also very heavy, and so we find that in

our Cold Season the whole of Central and Northern Asia is occupied by a mass of cold, heavy air, forming a centre of High Pressure. Since it is heavy this air flows outwards from the centre of Asia in all directions on to lower ground, giving rise to cold, dry winds blowing outwards from the centre of Asia. The winds are dry because they are land winds ; the only places where they become damp is where they cross some area of sea. We shall see later that in crossing the sea they bring a little rain to Japan, South China, and Ceylon. Everywhere else the winds are dry, and Asia receives very little rain in the cold season except in the East Indies, which lie in the Equatorial Rain Belt. The Himalaya Mountains form a great climatic barrier and protect India, so that we do not feel the very cold winds from Central Asia.

Conditions in the Hot Season, or "Northern Summer."—At that season of the year when the sun is shining vertically to the north of the equator everything is changed. Notice where the Tropic of Cancer runs. All lands along that line become very hot indeed—as we know happens in India in the Hot Season. The hottest part of all is the North-West of India—the plains of the Punjab. Although it is high above the level of the sea, even the great plateau of Tibet becomes warm, and the Desert of Gobi is hot. So we find a great area of hot air over Central Asia (Desert of Gobi) and the northern part of India. Hot air is light, and so there is also an area of low pressure, the principal centre of low pressure being over North-Western India. At this time of the year, then, the cool, rain-laden winds from the ocean flow in towards the centres of low pressure, and bring rain to nearly all parts of Asia. Look at Fig. 113 very carefully, and notice the arrows showing the direction of the wind.

The Climates of Asia.—You have now learnt the great essentials of the climate of Asia—dry during half the year, when the wind is blowing outwards from the High Pressure Centre, and wet during the other half of the year

when the wind is blowing inwards towards the centres of Low Pressure.

Owing to the great area of Asia there is, however, a great range of climates.

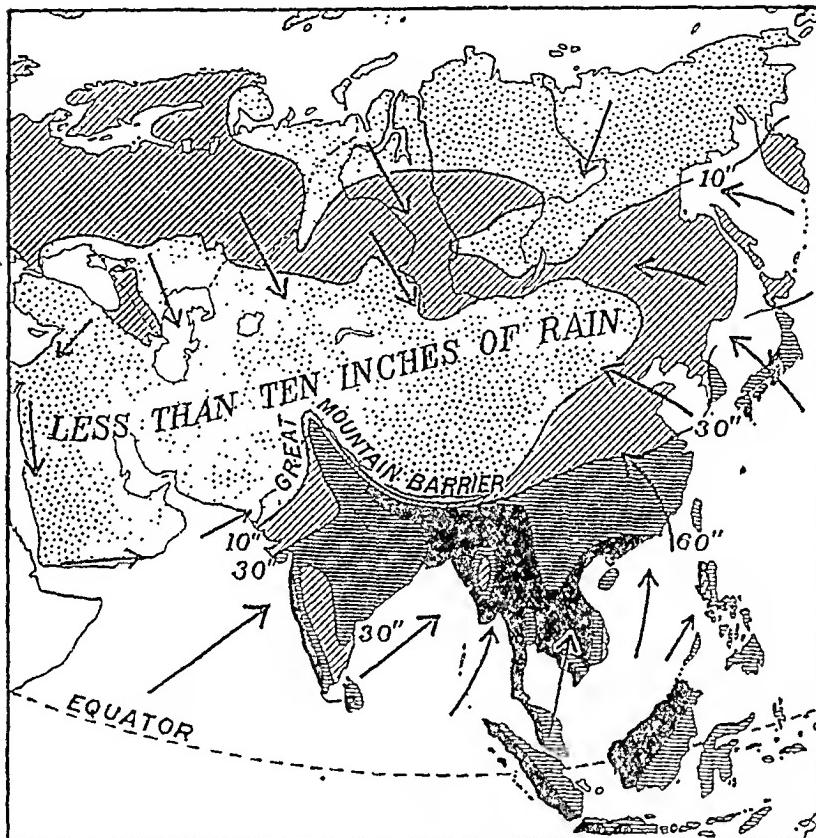


FIG. 113.—Conditions in the hot season—Rainfall from May 1st to October 31st.

The warm moist winds bring a heavy rainfall to the coasts. All parts marked black have more than 60 inches of rainfall. But the winds lose all their moisture before they reach the hot interior of the continent, which has less than 10 inches of rain in the half-year.

(1) *The Equatorial Climate*, found in the East Indies and Malaya, with heat and rain all the year round.

(2) *The Monsoon Climate*, which is the climate we have in India, with a Dry Cool Season, a Hot Season when the

land is getting heated up, and a Wet Season when the wind is blowing inwards from the sea. This climate is found in India, Indo-China, and part of China. China is colder than India, and the climate may be called "Warm Temperate Oceanic," or "China Type." Japan has a similar but less extreme climate, with the wet season in winter on the north coast.

(3) *The Desert Climate of Central Asia.*—Although the great deserts of Central Asia—the Deserts of Gobi or Shamo—are outside the Tropics, the climate is somewhat similar to the deserts found within the Tropics, i.e. of Arabia, Persia, and India. All the desert regions are characterised by very low rainfall and great extremes of temperature. The great difference between the deserts of Central Asia and those of Arabia is that Central Asia is below freezing for many months of the year—the Cold Season.

(4) *The Temperate Grassland Climate* occurs to the west, where Asia adjoins the steppe land of Europe.

(5) *The Cold Temperate Climate*, with Coniferous Forests, is found in Siberia.

(6) *The Arctic Climate* occurs in the north.

(7) *The Mediterranean Climate* with rain in winter occurs in Asia Minor and Syria.

#### 4. NATURAL VEGETATION

The natural vegetation of Asia depends on the climate, and each type of climate really has its own vegetation.

(1) *Hot Wet Evergreen Forest* is found in the East Indies and wetter parts (more than 80 inches of rain per year) of the Monsoon Lands.

(2) *Monsoon Forest and Scrub*, in which the trees lose their leaves in the dry season, are the characteristic vegetation of Monsoon lands. China, with its cooler climate, has forest rather different from that of India.

(3) *The Deserts* are often quite bare, but may have patches of scrub or poor grass land.

(4) Grasslands (steppes) are found mainly in the west of Central Asia, connecting with the Steppes of Europe.

(5) Coniferous Forests occur as a broad belt in the north.

(6) Tundra is found in the extreme north.

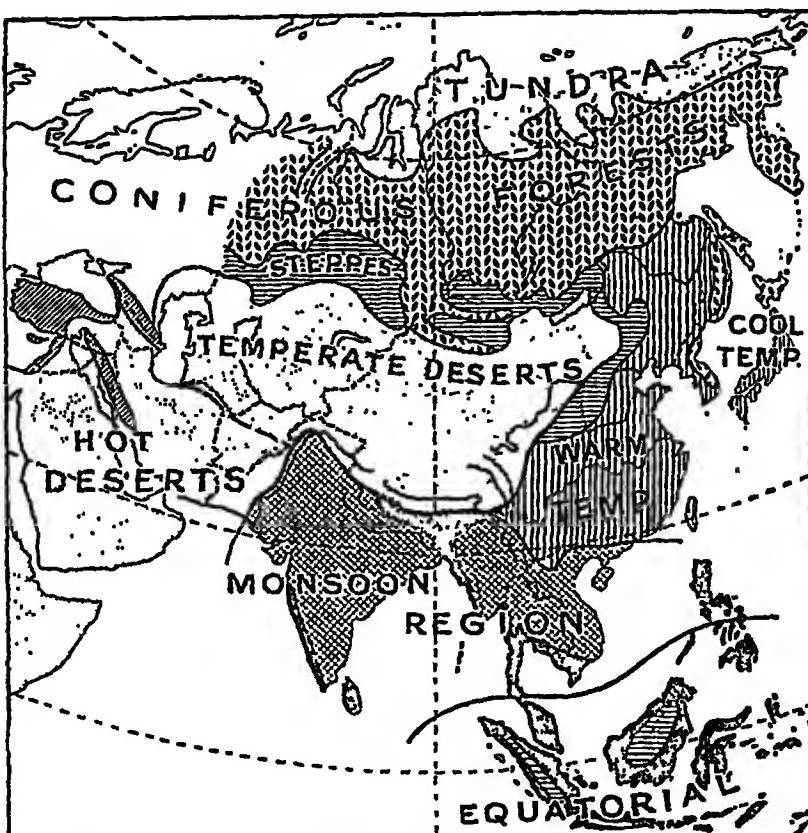


FIG. 114.—The natural vegetation of Asia.

Compare this map with what is said about the climates of Asia. In the part marked "Monsoon Region" evergreen forests are found in the wettest parts, monsoon forest in the areas with a moderate rainfall; scrubland where the rainfall is poor, and desert in the driest parts.

(7) Mediterranean Woodland occurs in Asia Minor and the neighbouring parts of Syria.

(8) Alpine or Mountain Vegetation occurs on the heights. Study Fig. 114 carefully.

### 5. POPULATION

Asia, which is the largest continent, has also more people than any other continent. But, curiously enough, most of the people are found in two countries—India

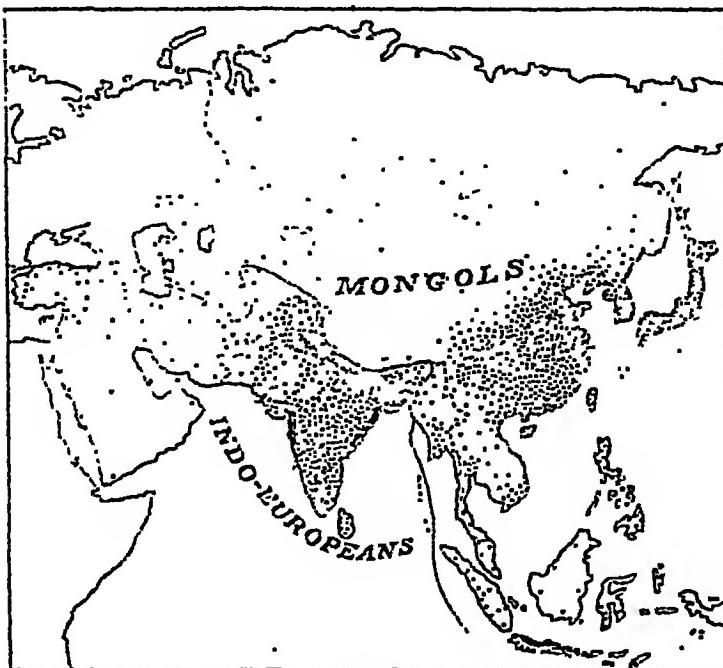


FIG. 113.—The population of Asia.

Each dot represents 5 lakh, or half-a-million people. Notice that the thickly populated countries are India, China, Japan and Java. This little map is drawn on Gall's Projection, and so Asia appears a different shape from what it does on Figs. 106 to 114.

and China. Look at Fig. 115 and notice how thickly populated these countries are in comparison with other parts. There are also large numbers of people in Japan and the East Indies. We have learnt that the Himalayas form a great climatic barrier. They form a great barrier to man also, and divide the two great races of mankind—

the yellow-skinned, oblique-eyed Mongolians on the one side and the brown-skinned Indo-Europeans (including the Indians) on the other.

Asia is often called the continent of extremes. It has the highest mountains and the highest plateaux as well as the largest stretches of lowland in the world ; it has the coldest as well as some of the hottest places, the wettest and some of the driest, the most thickly populated and some of the most thinly peopled lands in the world.

### THE INDIAN EMPIRE \*

1. India is one of the most important members of the British Commonwealth of Nations. She is one of the most fertile and most thickly populated countries in the world ; her people are the most advanced of all the races living in the Tropics, and boast a history of greatness going back for many thousands of years. But a study of India's history reminds us that it is only during the last hundred years, when India has been under British influence, that the country has progressed towards peace and prosperity. Little by little peace and harmony have come to dwell, cementing together for the first time 353,000,000 people of different races, languages, and religions. Thus unified, India is fast taking her rightful place amongst the great commercial nations of the world.

India is naturally shut in and defended by a great wall of mountains. There are three parts which lie outside the wall but still form part of the Indian Empire. They are the unimportant dry lands of Baluchistan ; the cold uninhabited plateau of Northern Kashmir ; and the large, important, and fertile land of Burma. In many ways Burma is quite different from the rest of the Indian

\* This section is abridged, with the exclusion of the introductory matter, from Part IV. of Longmans' "Regional Geographies of India."

Empire. There are two areas lying inside the wall which do not form part of India—the independent state of Nepal and the island of Ceylon.

## 2. POSITION AND SIZE

India lies entirely to the north of the equator. The southernmost point of the mainland, Cape Comorin, is in latitude  $8^{\circ}$  N. The Tropic of Cancer passes right through

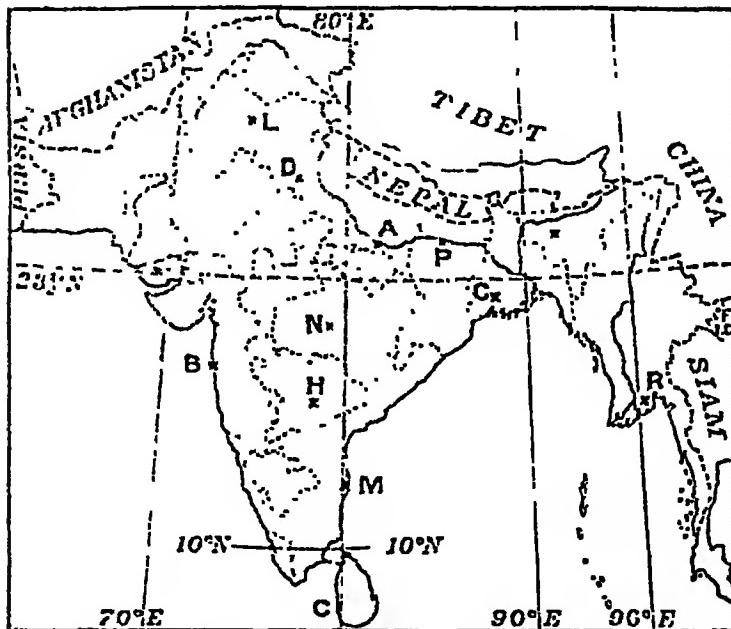


FIG. 116.—The position of India.

India, cutting the country roughly into two halves. Notice the position of this line. The northern frontier of India reaches  $37^{\circ}$  N. Although roughly half of India lies outside the Tropics, in the Temperate Zone, we always think of India as a tropical country. We can do this because it is well marked off from the rest of Asia by its mountain wall, and has a common type of climate throughout. The

Indian Empire stretches from longitude 61° E. to 101° E.—that is, one-ninth of the way round the globe. Notice the position of longitude 80° E.—through Jubbulpore and almost along the Madras coast. Longitude 70° E. passes through the Indus Valley, and 90° through the Delta of the Ganges. The guide line for the centre of Burma is 96° E., passing through Mandalay and nearly through Rangoon. We have already learnt, by comparing the size of India with the continent, that it is a very large country—2500 miles from east to west, 2000 miles from north to south. Its area is 1,800,000 square miles. Notice the countries which border India—Persia and Afghanistan on the west, Russian Turkistan and Tibet on the north, China, French Indo-China, and Siam on the east. India has 6000 miles of land frontier and 5000 miles of sea frontier. Notice the favourable position of India for sea trade—with Europe *via* the Suez Canal; with Africa: with the Far East *via* Singapore; and with Australia. India takes its standard time from the meridian of 82° 30', which is 5½ hours ahead of Greenwich time. Burma has its own standard time, and Calcutta uses its own local time.

### 3. PHYSICAL FEATURES

Looking at a physical map of India, we see that the country is formed of three main parts:

- (1) A great mountain wall.
- (2) A great lowland plain, the plain of Hindustan, formed by valleys of three great rivers, the Indus, Ganges, and Brahmaputra.
- (3) A great plateau, the plateau of Peninsular India.

A fourth division must be added for Burma. Burma is composed chiefly of mountain ridges and long river valleys, nearly all running from north to south. Only one part of Burma is really flat, and that is the main valley of the Irrawaddy.

**The Coast-Line.**—Compared with the size of the country the coast-line of India is short, for there are few

bays or gulfs. Places in the heart of India, like Delhi and Nagpur, are thus a long way from the sea. The result of this has been that the people of India are not, as a whole, a seafaring people. Another result is that India has few good harbours. The west coast of Peninsular India is rocky, and the sea is deep quite close to the coast. There are three inlets which form good natural harbours—

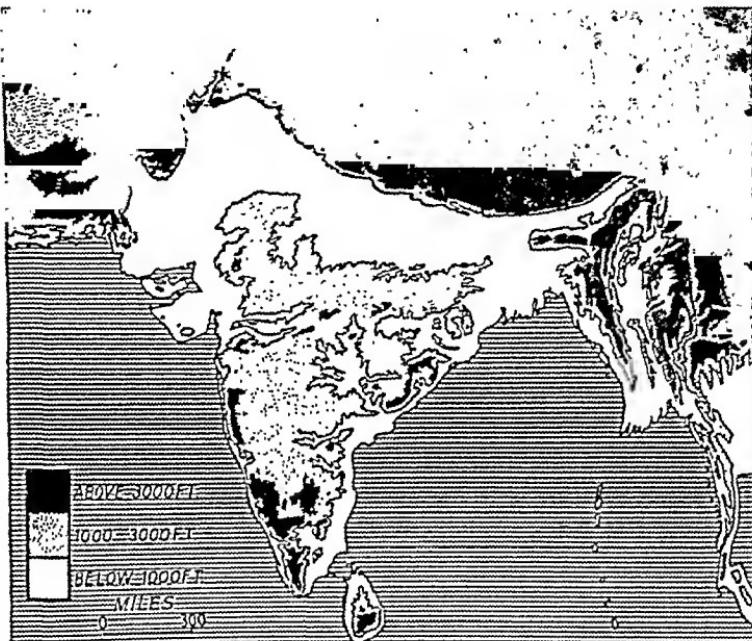


FIG. 117.—Physical or contour map of India.

Bombay, Goa, and Cochin ; but the last of these is partly blocked by sand. The east coast of Peninsular India is less rocky, but the sea along the coast is shallow, so that the great waves break some distance from the shore. The sea is thus too shallow for ships to approach the shore, whilst the surf makes it dangerous to land in small boats. The only important harbour on this coast, Madras, has been built by man. Where the great Plain of Hindustan

reaches the coast it is flat and the water is shallow. The only harbours are certain river mouths, such as the River Hooghly on which Calcutta stands.

Ceylon is the only important island lying off the coast of India, to which it is very nearly joined by a line of sand-flats and rocks called Adam's Bridge.

Just as Burma is very different from the rest of India, so is its coast-line. The coast-line both of Arakan and Tenasserim is very broken up and fringed with numerous islands. There are numerous inlets suitable for harbours, but high mountains lie close to the coast, and so there are no important ports. The great port of Burma, Rangoon, lies on a river estuary.

**The Mountain Wall.**—Remember what we have learnt of the mountain systems of Asia and the names which have been given to various parts of India's mountain rampart. From the Pamir Knot in the north the greatest range of all is that of the Himalayas (the "abode of snow"), with many of the highest mountains in the world: Mount Everest, 29,000 feet; Kinchinjunga, 27,815 feet; and many others. Another great range, which is really a northern branch of the Himalayas, runs eastwards from the Pamir Knot, and is known as the Karakoram Range. One of its highest peaks is Mount K<sub>2</sub>, or Mount Godwin Austin (28,250 feet). To the north of the Himalayan Range lies the plateau of Tibet, the highest in the world.

Running south-westwards from the Pamir Knot and separating India proper from Afghanistan and Baluchistan, is the Sulaiman Range, passing southwards into the Khirthar Range.

The mountain wall between India and Burma has received various names. In the north it is a narrow wall, and is known as the Patkoi Hills; then it broadens out into the Naga Hills and the Manipur Plateau, sending out a great branch westwards into Assam. This branch forms the Jaintia, Khasi, and Garo Hills. Southwards from Manipur are the Lushai Hills, and then again a narrow wall known as the Arakan Yoma. The Arakan Yoma

reaches the sea at Cape Negrais, but is continued in the Andaman and Nicobar Islands.

On the eastern side of Burma there is another series of mountain ranges, running from north to south, near the border of China.

**The Plain of Hindustan.**—Inside the mountain wall, and forming a great curve from the Arabian Sea to the

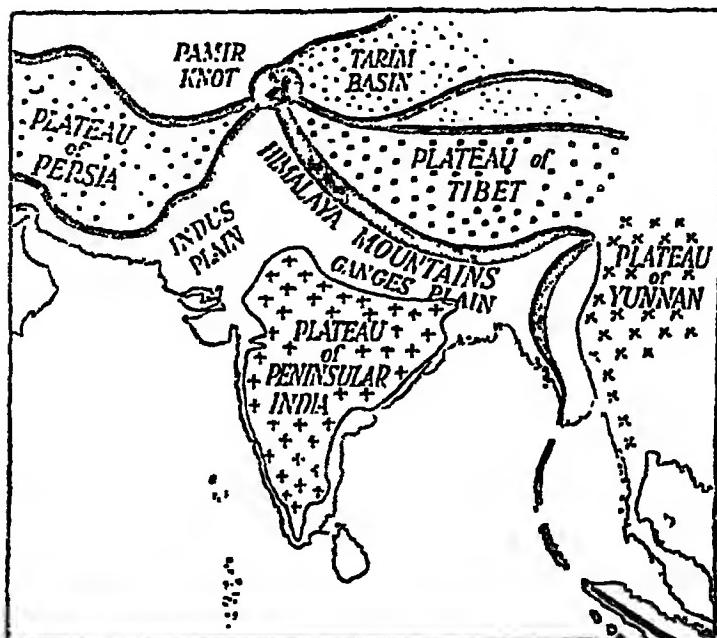


FIG. 118.—The mountains and plateaux of Southern Asia and the physical regions of India.

Bay of Bengal, is one of the most important plains in the world. It occupies the greater part of Northern India, and is more than 2000 miles from end to end, and usually from 150 to 200 miles broad. This great plain is formed by the basins of three rivers and their tributaries. In the west and draining into the Arabian Sea is the River Indus. Farther east is the River Ganges, which flows south-east-

wards into the Bay of Bengal. The city of Delhi, the proud capital of India, stands nearly on the water-parting between these two river basins. Before the Ganges reaches the sea it is joined by the third of the mighty rivers, the Brahmaputra.

Throughout the whole of the plain of Hindustan there is not a hill to be seen. The floors of the river valleys rise so gradually that the slope cannot be seen. Nearly 1000 miles from the mouth the surface of the River Ganges is only 500 feet above sea-level.

**The Plateau.**—Nearly the whole of India south of the great plain of Hindustan is occupied by a plateau. The western side is the higher, and the surface slopes down towards the east. The western edge of the tableland stands up high above the surface of the sea, and is known as the Western Ghats (*ghat* = "step"). Notice that the Western Ghats are different from the ranges of mountains in the mountain wall. They are really only the western edge of the plateau. In the same way the lower eastern edge forms the Eastern Ghats. The Eastern Ghats are interrupted by a number of river valleys. The plateau as a whole is higher in the south—in Mysore—than it is in the north.

Between the Western Ghats and the sea there is a narrow coastal plain; between the Eastern Ghats and the sea there is a broader coastal plain.

The surface of the plateau is by no means smooth. It has been deeply furrowed by river valleys. Then, towards the north a very important line of mountains runs across the plateau from west to east. These mountains are the Satpura Range, continued eastwards as the Mahadeo Hills and Maikal Range. This line is a very important one, for the mountains are not easy to cross, and so it cuts off "Northern India" from what is properly called "Peninsular India." Throughout history this line has been an important barrier. There are two other parallel lines—the Vindhya Range to the north and the Ajanta Range to the south—which have helped to make the line more important.

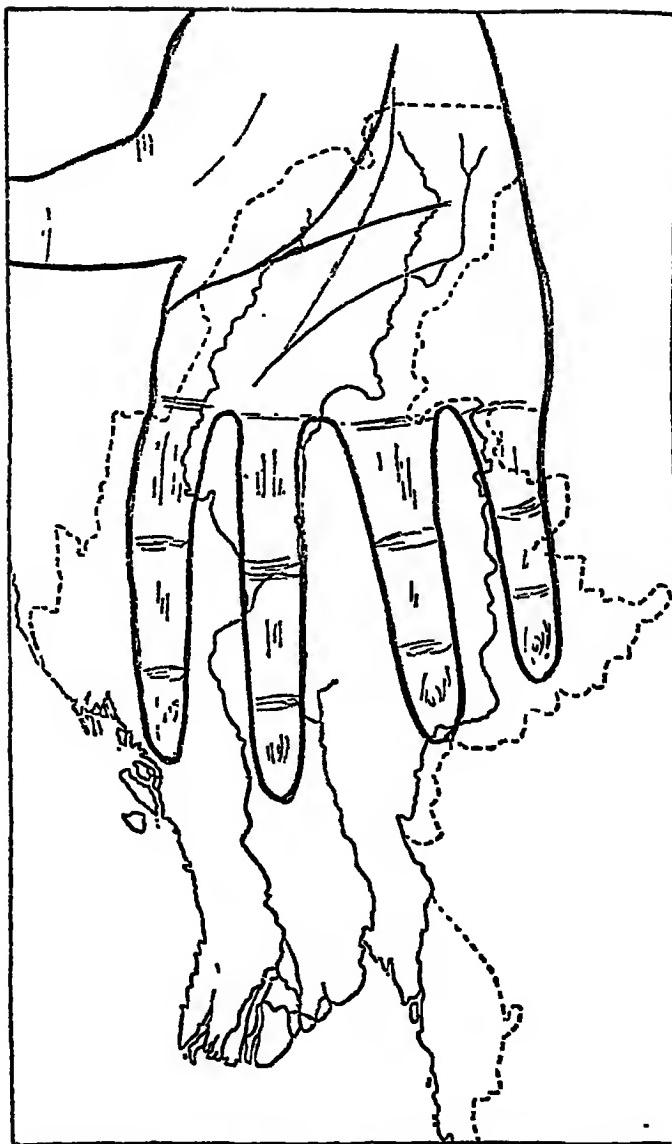


FIG. 119.—Diagram showing the mountain ranges of Burma.

Northwards from the Satpura line the plateau slopes down towards the plain of Hindustan. In the north-west, interrupting the general slope, is the Aravalli Range.

**Mountains of Burma.**—The mountains of the province of Burma are arranged like the fingers of a man's hand. Hold your right hand with the palm upwards and the fingers pointing towards you. Each finger will then represent one of the mountain ranges of the country. Your thumb, sticking out to the left, is the Himalayan Chain. Your first finger is the Arakan Yomas. Your

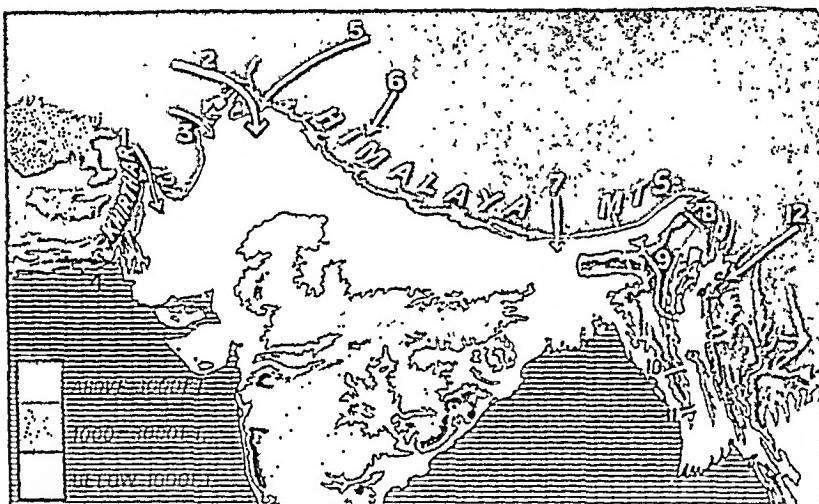


FIG. 120.—The mountain wall of India.

second finger, smaller than the first, points in the same direction as the Pegu Yomas. Your third and fourth fingers have become broad and flattened, and together form the Shan Plateau, divided into two halves by the narrow Salween Valley. These points are illustrated in Fig. 119.

**Doors through the Mountain Wall of India.**—There are no easy ways through the mountain rampart which surrounds India, but there are some difficult passes by which people from outside can approach India. In bygone ages India has been invaded from the north-west.

The two more important doors by which the invaders came were the Bolan Pass (1) and the Khyber Pass (2), which you see marked on Fig. 120. Another pass is the Gomal Pass (3). These doors are still important. Another route is along the sea-coast of Makran (4). There are two difficult roads leading from the town of Srinagar in Kashmir across the Zojila Pass and the Karakoram Pass (5). From Punjab to Tibet is the Shipki Pass (6) : but for hundreds of miles there is no route across the Himalayas until Darjeeling (7) is reached.

**Back Doors into Burma.**—Fig. 120 shows you the doors through the mountain wall which separates India from Burma. They are very little used, and nearly every one goes to Burma by sea—from Calcutta or Madras to Rangoon. There are also routes from China to Burma. The most important is through Bhamo. Across the mountains between India and Burma there are four main routes—the Tuzu Gap (8), the Manipur Route (9), the An (10), and Taungup (11) Passes. From Burma into China are numbers of routes, of which the most important is the Taping Valley Route (12).

**The Rivers of Northern India.**—The great rivers of the plain of Hindustan all rise in the mountain wall or beyond it. The rivers are fed with water from the gradual melting of the snow which lies on the mountains. These rivers do not depend for their water entirely on the monsoon rains : they depend on the snow and rain which fall in the mountains at other times of the year. So we find these rivers are never dry ; they always have some water in them.

In the mountains these rivers are roaring, rushing torrents, pouring through gorges or narrow valleys, over waterfalls, and amongst great boulders. When they reach the plain of Hindustan, they become slow, broad rivers wandering lazily across the plain. So flat is the valley that often the rivers desert their bed and make a new course.

The three great river systems of Northern India are :

(1) The Indus River, with its tributaries the Jhelum,

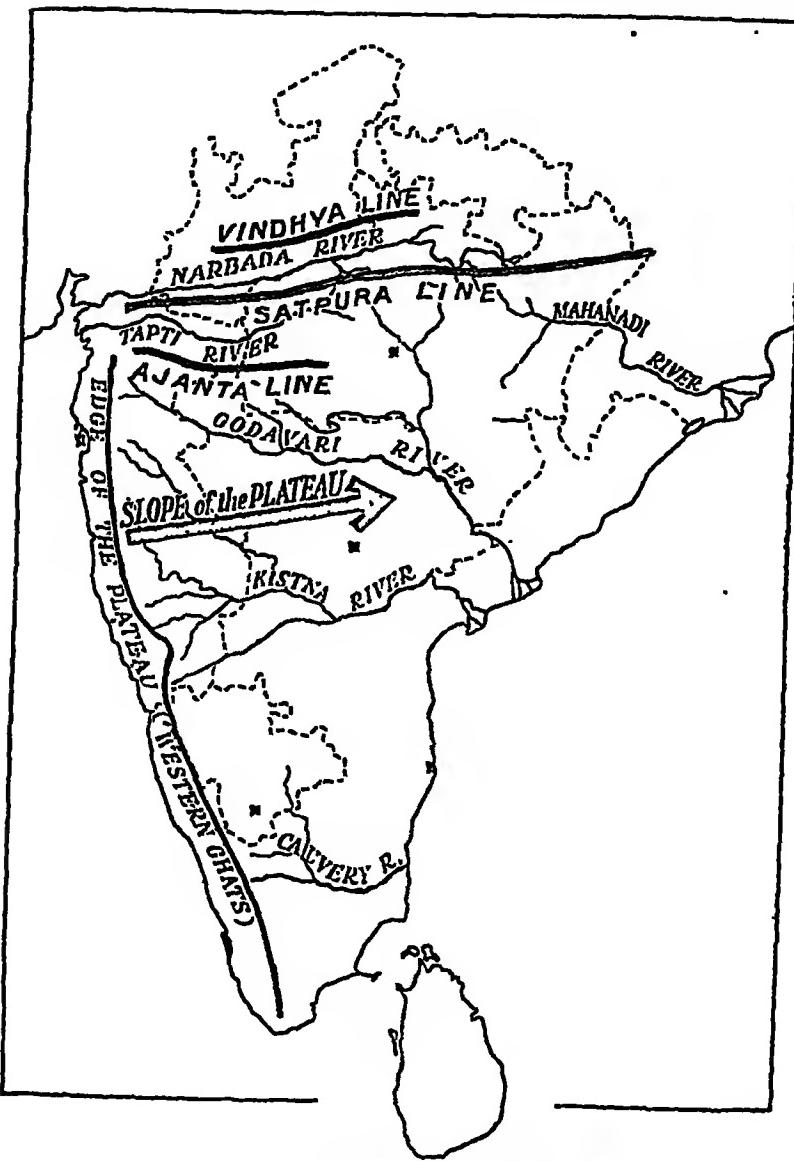


FIG. 121.—The rivers of Peninsular India.

Chenab, Ravi, Bias, and Sutlej (the five rivers of the Punjab). See Fig. 159.

(2) The Ganges River, with its tributaries the Jumna, Gogra, Rapti, and Gandak.

(3) The Brahmaputra River, which has no important tributaries.

The Rivers of Peninsular India.—The rivers of Peninsular India are quite different from the rivers of Northern India. They rise in the hills of the plateau, and they are fed only by the monsoon rains. In the Dry Season they often become almost dry—so nearly dry that only the smallest boats can use them. Owing to the general slope of the plateau, the rivers rise near the Western Ghats and flow towards the Bay of Bengal. The most important rivers are the Mahanadi, Godavari, Kistna, and Cauvery. Fig. 121 illustrates this.

We spoke above of the Vindhya, Satpura and Ajanta ranges, which run across the north of the Plateau from west to east. Between these ranges we find two important rivers—the Narbada and the Tapti, both flowing westwards.

The Rivers of Burma.—Like the Ganges and Brahmaputra, the rivers of Burma are mighty streams fed partly by mountain snows, and having water all the year round. The rivers flow in the valleys between the “fingers” of Burma (mentioned above). Between the first and second fingers are the Chindwin and the lower course of the Irrawaddy. Between the second and third fingers we find the Upper Irrawaddy, and, further south, the small Sittang. Notice how the Irrawaddy crosses over the second finger. Between the third and fourth fingers is the Salween.

The Rivers of Baluchistan and Tibet.—Both Baluchistan and Tibet are very dry countries. The rivers only flow after rain, and empty into shallow lakes, which often dry up in the Hot Season. These areas are thus regions of inland drainage.

Importance of the Rivers.—In nearly all respects the rivers of Northern India are more important than those of Peninsular India.

- (a) They yield a constant supply of water which can be used for irrigation.
- (b) They traverse, in their lower courses, broad flat plains of fertile alluvium, very suitable for irrigation.
- (c) They afford good highways of communication, though they are much less used than formerly.

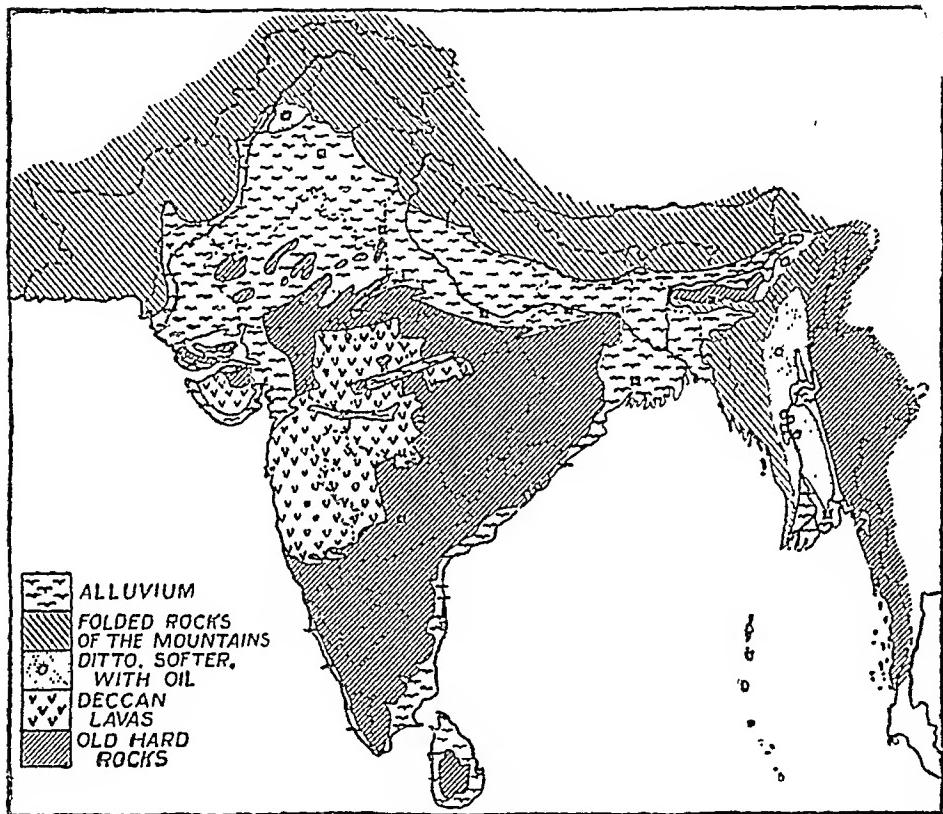


FIG. 122.—Geological map of India.

*Note.*—The area marked as alluvium in Ceylon is largely a lowland of laterite covering old hard rocks.

On the other hand, the rivers of Peninsular India—

- (a) Do not yield a constant supply of water.
- (b) Their valleys are less suitable for irrigation.
- (c) Are not navigable for long periods of the year.

Notice also that the rivers of Northern India have a

long upper course in the mountains ; the rivers of Peninsular India have not.

#### 4. GEOLOGY AND MINERALS

The main features of the geology of India correspond very closely with the physical features. The mountain walls consist mainly of folded sedimentary rocks. The plain of Hindustan consists almost entirely of alluvium, and so do most of the coastal strips, and of course the river deltas. In the Ganges Valley the alluvium is many hundreds of feet thick. In the Upper Ganges Valley and the Punjab, there are hard pieces in the soft alluvium called "Kankar." The Indian Plateau consists mainly of very old crystalline rocks. This mass of old rocks was in existence long before the great Himalayan fold mountains were formed ; it has for long ages formed a "solid block" of much-altered and folded rocks. On the edge of the plateau are areas of sedimentary rocks, important because they are coal-bearing. Nine-tenths of the coal of India comes from the Jharia and Raniganj fields, in the north-eastern part of the plateau, but there are also coal-bearing beds in the Godavari Valley and on the northern slopes of the plateau.

Nearly the whole of the north-west of the plateau has been covered by great sheets of lava—the Deccan lavas. This region is one of the largest areas of lava in the world.

Many valuable minerals occur associated with the old crystalline rocks. Gold is obtained especially from the Kolar Goldfield. Manganese comes mainly from the Central Provinces, but is also found near Vizagapatam and Mysore. Copper and iron are found in other parts of the plateau, especially in Bihar and Orissa. Mica is mined in Madras, and in the north-east of the plateau.

The island of Ceylon is a detached portion of the

Deccan plateau, and is famous for its graphite and gem stones.

The Shan Plateau of Burma, with its continuation southwards into Tenasserim, is another region of old hard rocks rich in minerals. One of the largest deposits of the ores of silver and lead in the world is found at Bawdwin ; large quantities of tin and wolfram are obtained

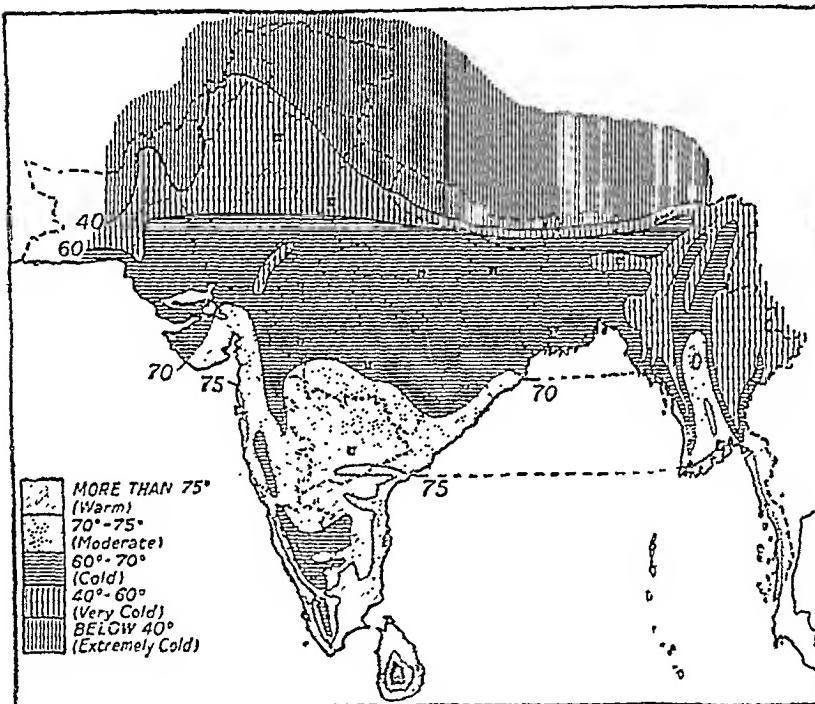


FIG. 123.—Temperature map of India for January.

near Tavoy and Mergui ; rubies and other precious stones are found near Mogok.

Mineral oil, or petroleum, is found in young soft rocks, usually on the borders of great fold ranges. Most of the oil of the Indian Empire comes from Burma—from the oilfields of Yenangyaung, Singu, Minbu, Yenangyat, and the Upper Chindwin. Some oil is also obtained in Assam, and an important field is now being worked near Attock, in the Punjab. (Study Fig. 122 carefully.)

### 5. CLIMATE.

**Temperature.**—Considering first conditions during the Cold Season, we can take the month of January as typical. The sun is then shining vertically a long way to the south of India, and, as we should expect, it gets cooler as we travel from south to north—from an average of

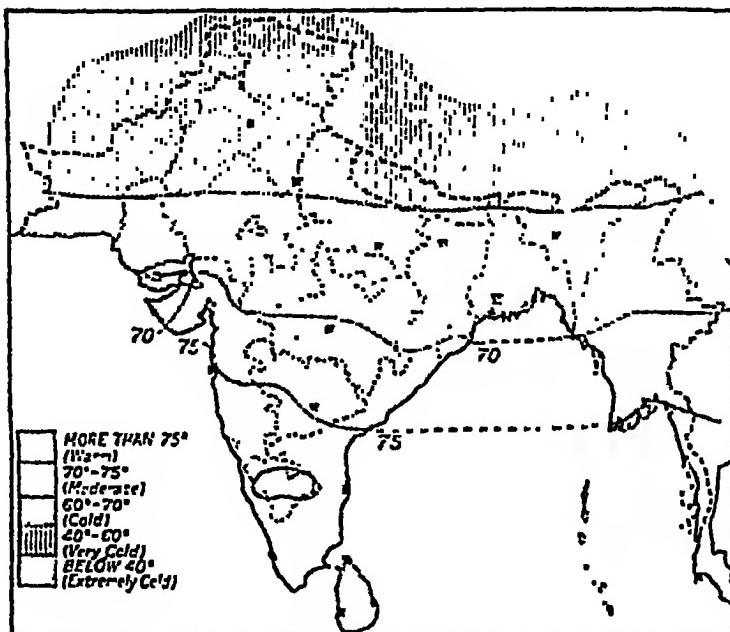


FIG. 124.—Isotherm map of India for January.

Compare this map very carefully with the actual temperature map, Fig. 123. Notice the effect of reducing the temperature to sea level.

80° at Colombo to 55° at Lahore, and of course even colder in the hills. This is well seen in Fig. 123. The coldest parts are in the north and in the mountains. In July the sun is shining directly over a large part of India, and we should expect the land to get very hot. This is largely true, and the plains of the Punjab are among the

from about the end of October to February or March, but we usually refer to them here as the North-East Monsoon. The North-East Monsoon is a land wind, and so is dry, except after it has crossed the sea.

The land mass in Northern India gradually gets hotter, until, in May or early June, the hot air rises. A current

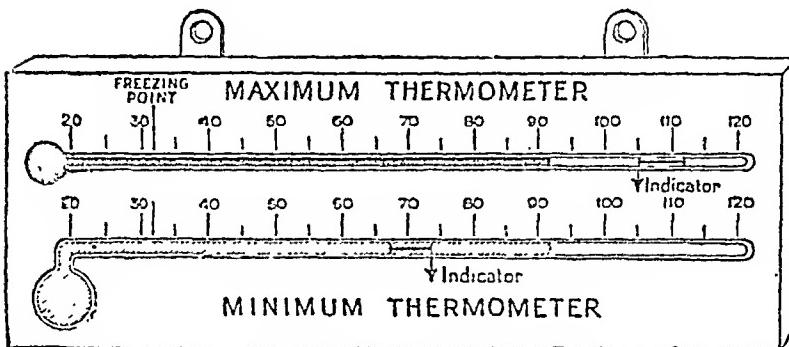


FIG. 127.—Picture of maximum and minimum thermometers seen at Lahore.

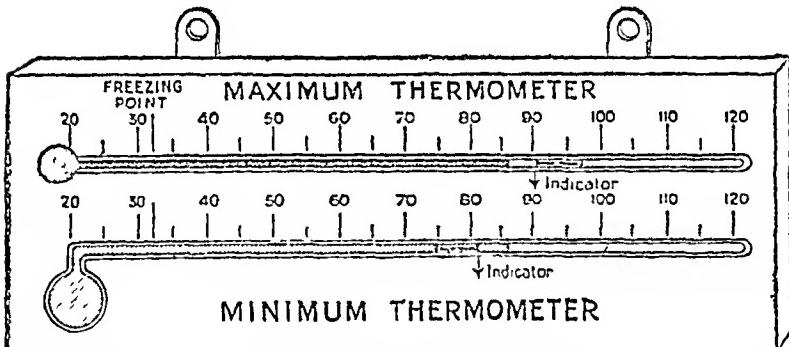


FIG. 128.—Picture of maximum and minimum thermometers seen at Bombay.

of cool air is drawn in, forming the South-West Monsoon. Since this wind comes from the sea, it brings rain to most parts of India.

The North-East Monsoon does not everywhere blow from the north-east, neither does the South-West Monsoon everywhere come from the south-west. The actual

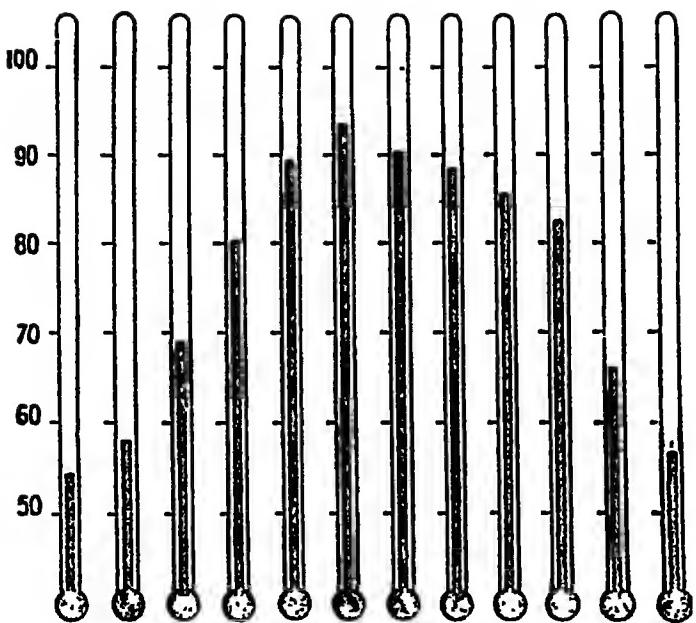


FIG. 129.—The temperature of Lahore.

Each little thermometer represents the average temperature for each month.  
Thus, the average temperature in January is 54° F.

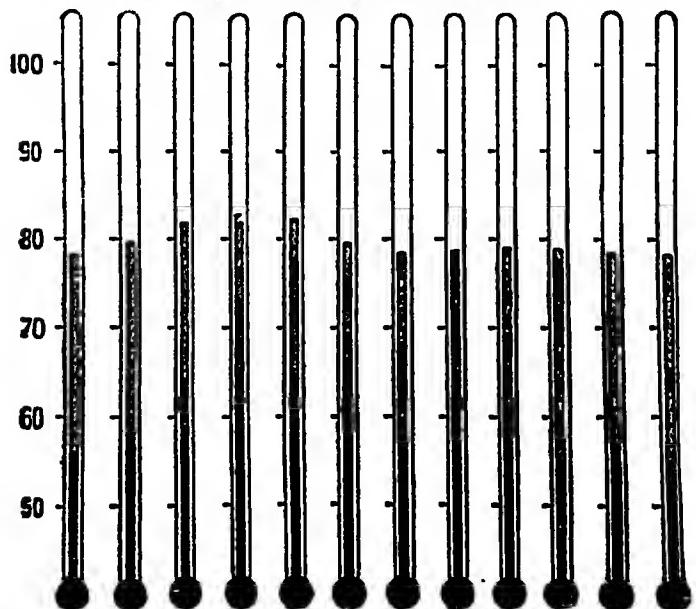


FIG. 130.—The temperature of Trivandrum.

*Rainfall in Southern India and Ceylon.*—In most parts of India the rains cease in September or October, but the Madras coast in Southern India and the island of Ceylon get a considerable amount of rain in October, November, and December. This is shown clearly in Fig. 133. The north-east monsoon has to cross the sea before reaching

these parts of India. Consequently it collects some moisture and deposits it on the coast, especially soon after the south-west monsoon has changed round into the north-east.

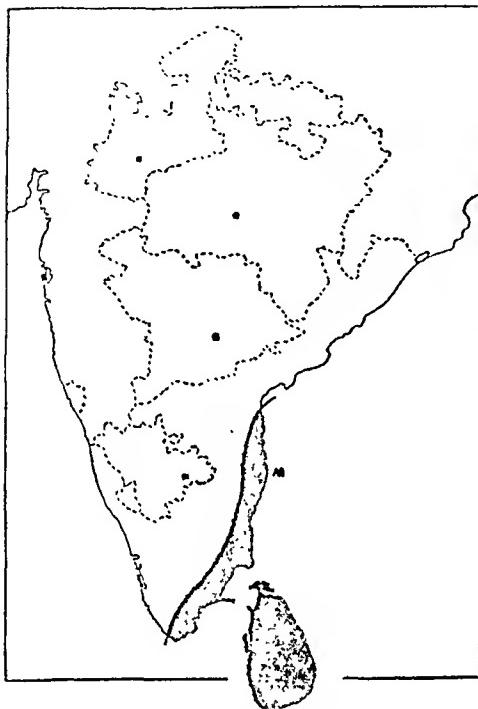
There is another region in the Indian Empire which receives rain in the later months of the year. That is the extreme south of Burma. Lands on the equator receive convectional rains through the whole year, and as Southern Burma is near that region it receives some rain during the months which are dry in other parts of India.

FIG. 133.—Cold season rains in Southern India and Ceylon.

Map showing the part of Peninsular India which has more than 10 inches of rain in November and December.

Baluchistan and Northern Kashmir are both outside the Monsoon region. They are both very dry, but receive their rain or snow mainly in the colder months.

*Rain-shadows.*—Look back at Fig. 132 and notice the very heavy rainfall on the west coast and the very small rainfall in the interior of Peninsular India.



The centre of Peninsular India lies in the "Rain-shadow" of the Western Ghats. This was mentioned under Fig. 132.

Look again at the rainfall map of India and notice the dry belt in the centre of Burma. This area is in the rain-shadow of the Arakan Yoma as shown in Fig. 134. Notice the heavy relief rains on the western side of the Arakan Yoma.

Again, the centre of the Brahmaputra Valley in Assam is in the rain-shadow of the Khasi Hills. Cherrapunji,

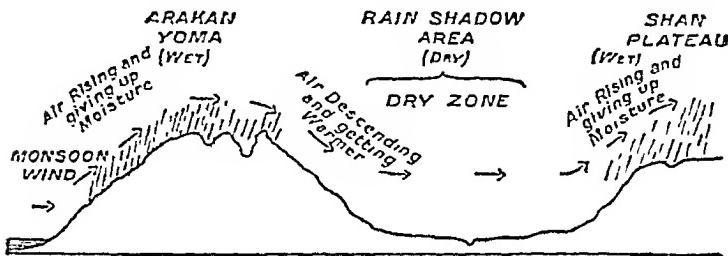


FIG. 134.—Section across Burma.

on the southern slopes of the hills, catches the full force of the monsoon and has one of the heaviest rainfalls in the world.

*Storms.*—Thunderstorms usually occur in India just about the beginning and end of the "Rains." When the North-East Monsoon has died away and the South-West Monsoon is just about to commence, the atmosphere is very disturbed, and thunderstorms occur. The same thing happens when the South-West Monsoon changes to the North-East, in October.

Violent storms often occur in the drier parts of India. There the sun shines very brilliantly, and the land becomes very hot by day, but at night gets very cold. The great difference in temperature often causes severe storms, which may sweep across India and do much damage. Dust-storms in the deserts are much to be feared, as are the cyclones at sea.

The Seasons.—Summarising what we have learnt of the climate of India, we may divide the year into three parts :

- (a) The Cool Season, from about the middle of October to the end of February, when the temperature is comparatively low, and there is little or no rain.
- (b) The Hot Season, from March to June, when the sun is shining vertically over India and the land gets very hot.
- (c) The Rainy Season, from about the middle of June to the middle of October. The South-West Monsoon is blowing and bringing the rain. It is cooler, because the clouds protect the land from the sun and the rain cools the air.

The Rainy Season commences, or as we say the rains break, at slightly different times in different parts of India, but June 15 is a normal time in many places.

#### 6. NATURAL VEGETATION

India is a thickly populated country, and over large areas the natural vegetation has been almost entirely removed by man. There is, for example, practically none left in the Ganges Plain. But in the hilly regions, and in the less thickly peopled parts, much of the natural jungle remains. The following are the principal kinds of natural vegetation in India.

(a) *Evergreen Forest*.—When the rainfall is more than 80 inches in a year (see Fig. 132) we find forest in which the trees are green all the year round. There are many different kinds of trees in these forests; often they are of very large size. But the wood of the trees is very hard, and up to the present has not been much used commercially. In these areas of very heavy rainfall nearly all the lowland has been cleared to make room for paddy-fields, but we find the forest, the natural vegetation, on the hills. It is found on the slopes of the Western Ghats; in the

wetter eastern parts of the Himalayas up to 5000 feet above sea-level; Assam; the Arakan coast of Burma and Lower Burma. Study Fig. 135, and note where it occurs.

(b) *Monsoon Forest*.—Where the rainfall is more than 40 inches, but less than 80 inches, the forest gets very dry in the Hot Season. The trees lose their leaves to protect

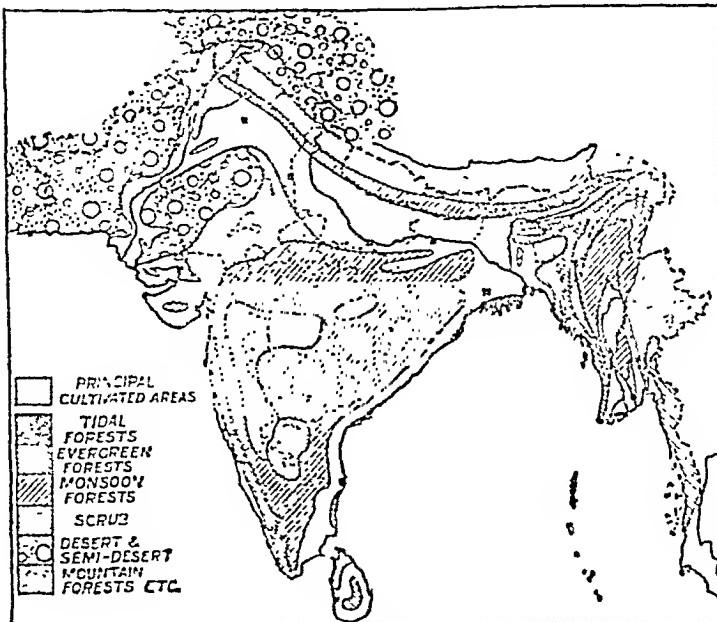


FIG. 135.—The natural vegetation of India.

themselves against the heat of the sun, and so the forest is leafless for part of the year. Such forests of good large trees but which are not evergreen we call "Monsoon Forests." They are very valuable, for in them grow the most important trees of India. The two most useful trees are the teak, which comes from Burma and the western part of the Indian Plateau, and the sal, which grows along the lower slopes of the Himalayas and in the north-east of

the plateau. The Monsoon Forests are so valuable that they are largely "reserved" by Government to prevent them from being destroyed by careless and wasteful use.

(c) *Scrub Forest and Scrubland*.—Where the rainfall is less than 40 inches in a year we find it is usually too dry for forests to grow properly. A few trees grow, but most of them are armed with spines or thorns to prevent their being eaten by animals. Forests of small thorny trees are called Thorn Forests. Sometimes the trees are so small that they are really only bushes, and are often far apart (scrubland). Scrubland covers large areas in the drier parts of India and Burma. In Peninsular India where there happens to be good soil on hill slopes better forests may be found although the rainfall is only just over 30 inches. One of the most useful trees in these dry parts is the eutech, from which a yellow dye is made.

(d) *Desert and Semi-Desert*.—As the climate gets drier and drier, so the thorny trees and bushes become rarer. Instead we find plants with thick fleshy stems and very long roots, which store up water in their fleshy stems and leaves.

(e) *Grassland*.—There is not much grassland in India. Patches occur on hilly regions, interrupting the Monsoon Forests.

(f) *Mountain Forests*.—On the hills and mountains of Southern India above 5000 feet, and in Burma and on the Himalayas above 3000 feet we find a great change. The forests are more like those found in Temperate lands. The trees are evergreen: some of them are of broad-leaved types like the oak, others have tall unbranched trees with needle-shaped leaves (Coniferous or Pine Forests). These forests are especially important on the Himalayas.

(g) *Alpine Vegetation and Alpine Forests*.—On the highest parts of the mountains it is too cold for trees to grow. We find only small bushes and short grass, or, where it is very dry, practically nothing at all. On the very highest parts of the mountains of Northern India (above 18,000 feet) there is always snow.

(h) *Mangrove Forests.*—There are certain trees which must have their roots covered by salt water at every high tide. The mangroves are the most important. We find them growing along the sea-coast where it is flat and muddy, and in the great river deltas. The mangrove forests of the Ganges Delta are called the "Sundarbans" after sundri, the Bengali name for mangrove.

*Useful Forest Products.*—The most valuable timber is teak, mainly from Burma. The pyinkado, or Burma ironwood, is another important tree, largely used for railway sleepers. The sal gives a good timber also. The pine trees of the mountains yield fine soft wood, as well as timber and resin, but the forests are difficult to reach. Many of the poorer kinds of wood in all parts of India are used for firewood. The mangrove forests are found in deltas where no other wood is available, and are therefore valuable for fuel. Bamboo is really a very large grass and grows in many parts of India, but especially in the Monsoon Forests. It is used for very many purposes. Another forest product is lac, a sticky substance produced by insects living in the forest trees.

The method of working the timber of the forests is interesting. It is cut in the dry season and dragged to the small streams by elephants or buffaloes. When the rains come the streams rise, and the logs are floated down to the bigger rivers. These logs are joined together to form "rafts" and floated down the rivers to saw mills, where the wood is cut up into planks.

#### 7. AGRICULTURE

India is essentially an agricultural country. Nineteenths of the vast population depend on agricultural pursuits for their existence. Despite the population of 320,000,000, there is still a surplus of food grains available for export. The following are some of the principal crops of India.

*Rice* is grown mainly on flat, alluvial land where there

is an abundant rainfall. Its distribution is shown in Fig. 136. This should be compared with the rainfall and physical maps. It forms the staple food of the people in the wetter regions of India. In the drier regions it becomes less important, and where the rainfall is less than 40 inches it can only be grown on irrigated land.

*Wheat*, which forms the principal food grain of most

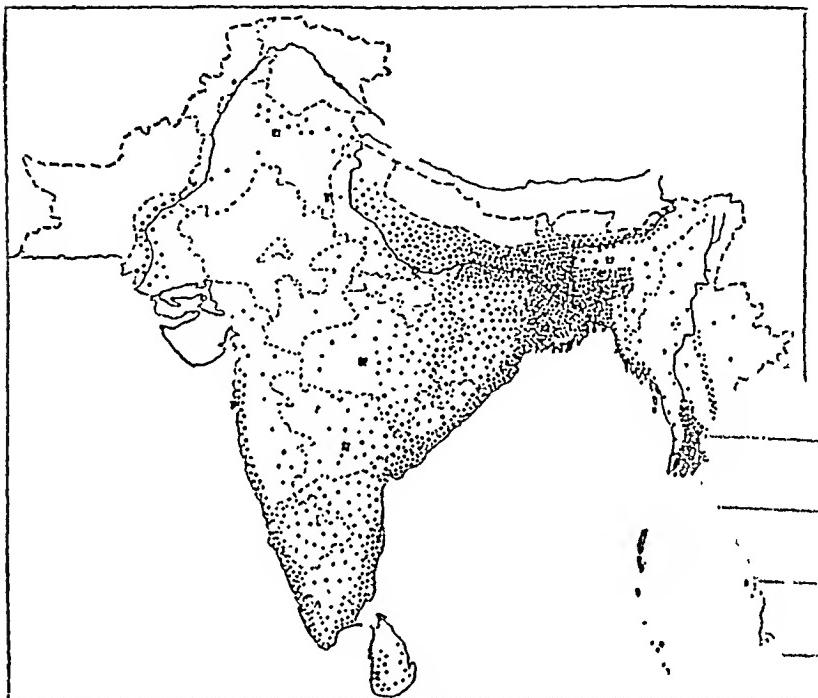


FIG. 136.—The distribution of rice in India.

Each dot represents 50,000 acres.

white races, has become the favourite food in the drier parts of Northern India. It is there a winter crop, so that the land can often be used for other purposes during the rest of the year. It is sown at the end of the rains, ripens at the end of the year before the great commences. So much is grown that there is usually over for export to Europe. Unlike rice, wheats

only a moderate amount of water and would be killed if the young plants were covered by water as rice is. Wheat is a very important crop in the Punjab and many of the northern parts of India where the rainfall is less than 40 inches. As we travel down the Ganges Valley into wetter regions it gradually disappears. This can be seen from Fig. 137.

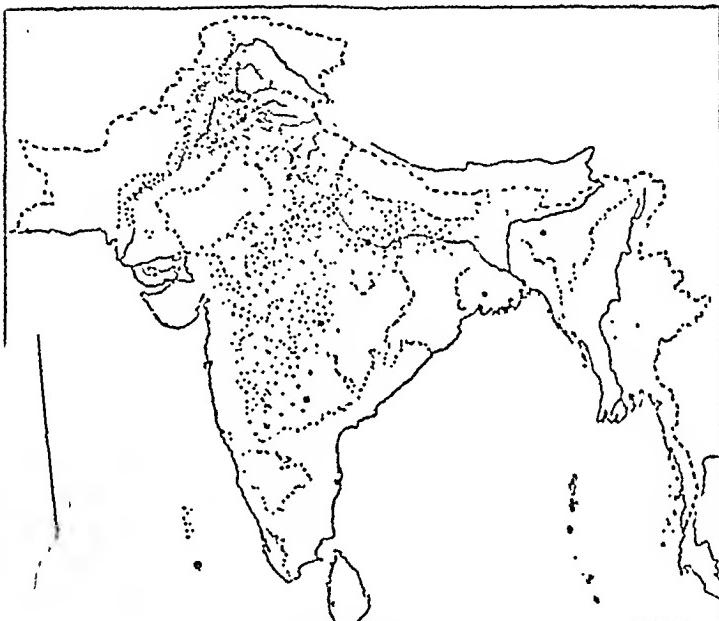


FIG. 137.—The distribution of wheat in India.

Each dot represents 20,000 acres.

*Barley*.—Barley is another important crop which grows largely in the same districts as wheat.

*Millet* forms the staple food of the people in most of the drier parts of India. There are several different kinds, the three principal being *cholam* or *jowar*, *cumbu* or *kurum*, and *ragi* or *marua*. Where the rainfall is less than 20 inches millet is everywhere important, and it can be

grown without irrigation even when the rainfall is as low as 20 inches. When the rainfall exceeds 40 inches it quickly disappears. Fig. 138 shows the distribution of millet.

*Maize* is grown both for its grain (Indian corn) and as fodder for cattle. In India it flourishes both on the plains and in the hills where the rainfall is moderate. We find

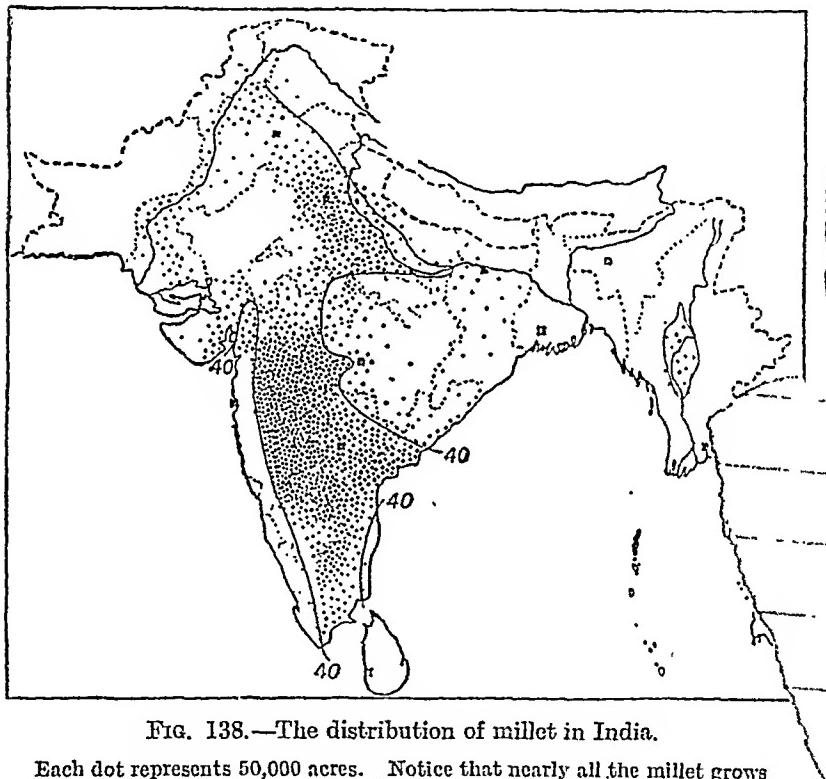


FIG. 138.—The distribution of millet in India.

Each dot represents 50,000 acres. Notice that nearly all the millet grows where the rainfall is less than 40 inches.

it with millet in dry regions, but also in damper regions too. But in the Lower Ganges Valley with a rainfall of 60 inches it disappears.

*Pulses* of many different kinds are cultivated throughout the country. The most important is gram, which is a good food as well as fodder for cattle and horses.

*Sugar-cane* is grown in nearly all the provinces

but most comes from the irrigated lands of the Upper Ganges Valley and the Punjab. From it jaggery is made. But not nearly enough sugar is produced in India, and enormous quantities are purchased from Java every year.

*Cotton* is the most important of the crops not grown for food. In India there are two principal kinds :

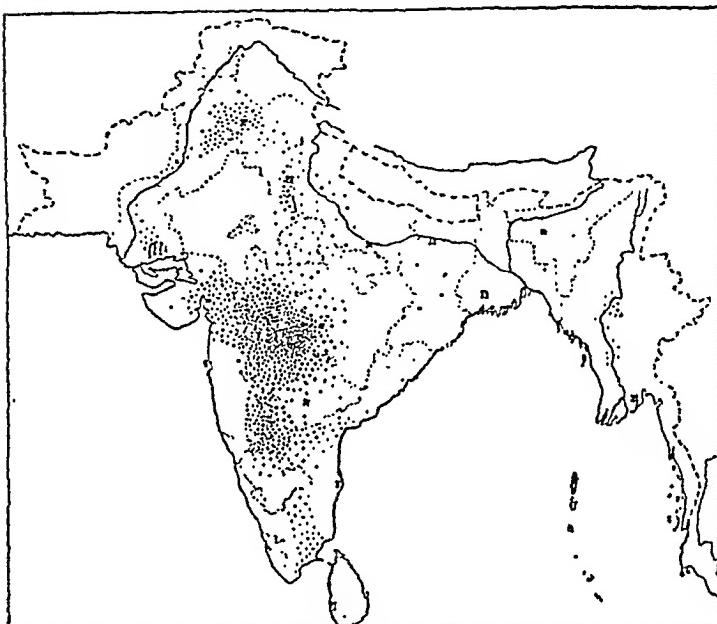


FIG. 139.—The distribution of cotton in India.

Each dot represents 20,000 acres.

- (a) Native Indian cottons with short hairs, or, as we say, a "short-stapled" cotton.
- (b) American cotton, of which the plants were originally brought from America, which has much longer hairs and is much more valuable.

Cotton is a dry-region crop, and flourishes where the rainfall is less than 40 inches. The soil is important;

one of the best is the sticky black cotton soil produced by the weathering of the Deccan lavas. The American cottons require more moisture and have to be grown on irrigated and carefully prepared soil, as in the Punjab. Fig. 139 shows the distribution of cotton.

*Jute* is a crop which is different from almost all others in that it is grown in enormous quantities in one part of the world only, and that is in the very wet lands of the Ganges Delta. The stems yield a very strong fibre from which most of the sacks in the world are made. Like rice it is a plant of the low, wet lands.

*Oilseeds*.—Plants grown for the sake of the oil obtained from their seeds include linseed, rape, mustard, sesamum, and ground nuts. They grow best with a medium rainfall, and often prefer slightly hilly country. A good proportion of the crop is grown for export.

*Coconuts* are also grown largely for the sake of the oil obtained from their nuts. The dried kernel of the nut, known as copra, is a valuable product and is sent abroad to be manufactured into soap, etc. A useful fibre, called coir, much used for making matting, is obtained from the outer shell of the nuts. Coconuts grow best in wet regions along the coast and are grown down the west coast, in the island of Ceylon, in the Nicobar and other islands of the Indian Ocean, and on parts of the east coast.

*Tea*.—The tea-plant is a shrub which requires a heavy rainfall, but must be grown on hill slopes or where the water does not remain near the roots. Most of the tea is grown for export. The hill slopes bordering the Brahmaputra Valley in Assam, the Himalayan slopes near Darjeeling and Dehra Dun, the island of Ceylon, and the slopes of the Nilgiri Hills are the chief centres. Tea is obtained from the dried leaves of the shrub.

*Coffee* was once important in Mysore, but a bad disease killed many of the plants, and other countries in the world, like Brazil, can grow coffee more cheaply than we can.

*Tobacco*.—Soil is often more important for tobacco than rainfall, and a little is grown in most districts of India.

In some places, like the delta of the Irrawaddy, enough is grown to be exported.

*Rubber*.—There are numerous rubber plantations in Ceylon, and some in Lower Burma and Travancore.

*Indigo* is a small plant from which a purple dye is made. It used to be important in the Ganges Valley, but it is now possible to make chemical dyes more cheaply, and the growing of indigo is not nearly so important as it was.

*Opium* is obtained from the seed-capsules of the opium poppy. It is smoked by the Chinese in small pipes instead of tobacco, and large quantities used to be sold to China. But it is not good for the people, and the Government has agreed not to sell any more and very little is now grown.

#### 8. THE ANIMALS OF INDIA

**Wild Animals**.—Just as the natural vegetation has disappeared over large areas in India, so the wild animals have disappeared also. We have to go to the mountains, or the thick forests or wild uninhabited lands to find the wild animals. Famous wild animals of India are the tiger and the elephant. Large numbers of elephants live in the wilder parts of the Monsoon Forests, and every year many are caught and trained, as, for example, in Upper Burma. They are caught by being driven into a very strong and narrow enclosure called a Keddah. The elephant cannot turn round in the narrow keddah, and he charges the end until he is tired out. Then he is tied up with chains and chained to a tame elephant. There are wild buffaloes and many small animals in most parts of India. Every year many people die from snake-bite. In some of the rivers crocodiles are dangerous.

**Domestic Animals**.—India is an agricultural country, and large numbers of buffaloes and oxen are needed for ploughing and as beasts of burden. In hilly regions horses, ponies, mules, and donkeys are more useful. In dry sandy regions camels and donkeys are much used. Then the flesh of animals is eaten in many parts of India.

We eat beef from oxen, and mutton from sheep and goats. We also get milk to drink from cows and goats, and butter can be made from the milk of the cow. The animals also provide us with clothing—wool from sheep, goat's hair from goats, and hair from camels; whilst leather is made from the skins of buffaloes, oxen, sheep, and goats.

*Elephants.*—The elephant is a very intelligent animal, and at the same time is very strong. He is most useful in the forests where trees are being cut down for timber. He has been taught to drag great logs of wood, or pick them up in his trunk and carry them and arrange them in neat piles. He is also used as a beast of burden, and can travel through thick jungle where there are no roads for bullock-carts.

*Oxen.*—Oxen are probably the most useful animals in India. There are enormous numbers of them, because they are used for ploughing and for drawing carts all over India. There is roughly one bull or bullock or cow for every two people. In many countries of the world, where horses or machines are used for ploughing, the bullocks are killed and used for food, while the cows are kept for the sake of their milk. The people in India do not use much milk, and the bullocks are valued more than the cows. In some parts of India, especially in the United Provinces, good rich fodder is grown and dairy farming is carried on. In many of the drier parts of India there is not sufficient grass to feed the oxen, so fodder has to be grown for them.

*Buffaloes.*—There are 28,000,000 buffaloes in India. The buffalo is heavier and stronger than the ox, but slower. Although the buffalo is very fond of the water and is much used in the rice-fields of Lower Burma for ploughing, we also find large numbers in the drier parts of India, as in the United Provinces.

*Sheep.*—There are 22,000,000 sheep in British India. They live mainly on the dry hilly parts, where they can live on grassland or waste land which is not good enough for cattle. They are most abundant in Madras. This you

will see illustrated in Fig. 140. Compared with the sheep of other parts of the world, those of India are very poor. They do not give very good wool or meat.

*Goats.*—Goats are to be found everywhere in India, for they are very easy to keep. They can live on the poorest of grass or shrubs, and find enough to eat even in the driest parts.

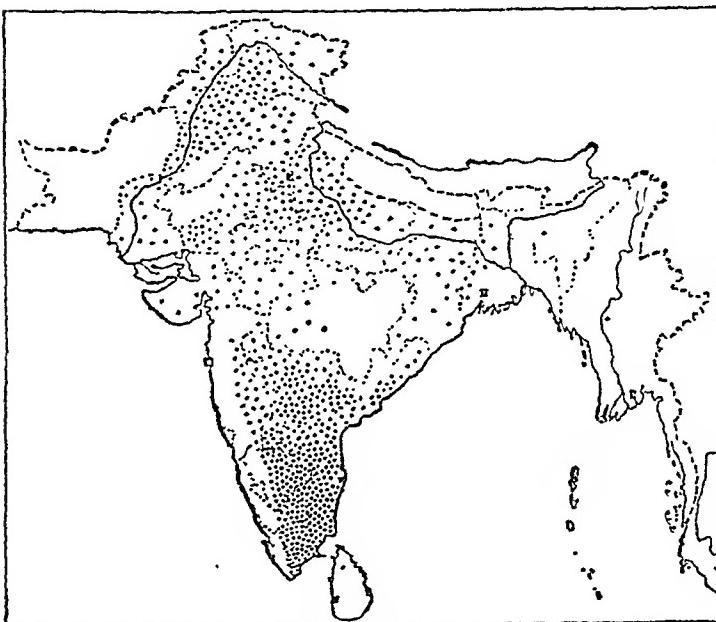


FIG. 140.—The distribution of sheep in India.

Each dot represents 50,000 sheep.

*Horses and Ponies.*—There are less than two million horses and ponies in India, which shows you that horses are not used for ploughing as they are in other countries of the world. They are mainly used for drawing small carts.

*Mules and Donkeys.*—Mules are very valuable in hilly

regions, as they are very sure-footed and do not slip on the narrow mountain paths. So goods are strapped on to their backs and carried across the mountains. Donkeys are used in the same way in the drier parts of India, and can travel long distances across dry sandy country.

*Camels.*—The camel is called the ship of the desert,

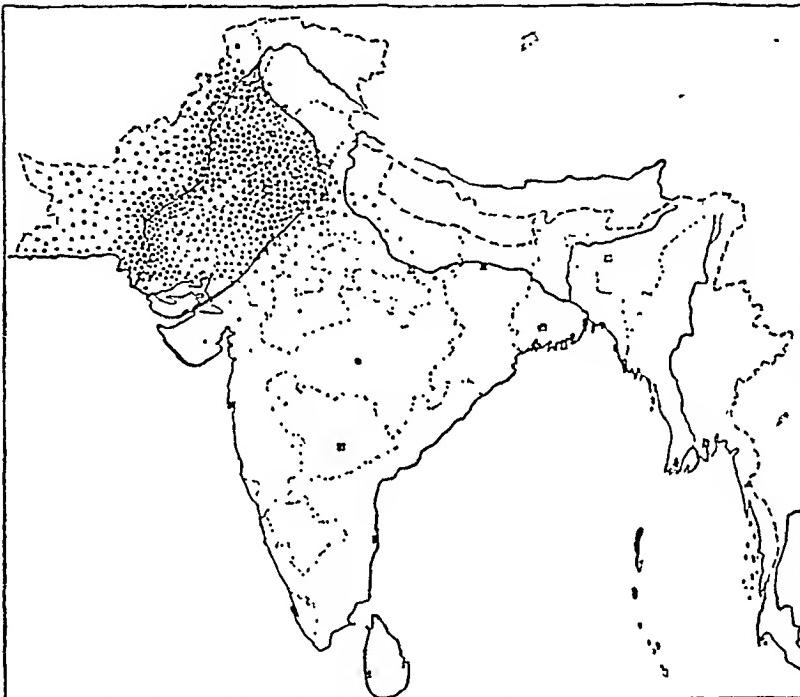


FIG. 141.—The distribution of camels in India.

Each dot represents 1000 camels. The line marked is the 20-inch rainfall line. Notice how nearly all the camels live where the rainfall is less than 20 inches a year.

because it can travel across deserts, going for long periods without water, and has broad feet which do not sink into the desert sand. So we find there are many camels in the dry parts, but none at all in the wet regions. This is an excellent example of "Climatic control" in relation to animals. You see this illustrated in Fig. 141.

### 9. POPULATION

**Distribution of Population.**—In the whole of India, including Burma, there are 353,000,000 (three hundred and fifty-three million) people. Now this is a very large number—so large that it is very difficult for us to realise what it means. Suppose you had to make one

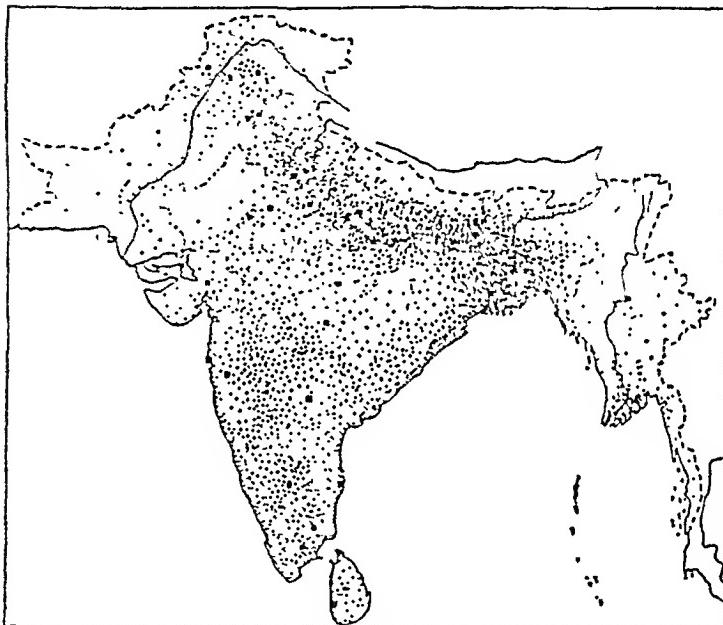


FIG. 142.—The population of India.

Each dot represents 100,000 people. Each square dot represents a town with more than 100,000 people.

stroke like this | to represent each person in India, and you started now making the strokes as quickly as you could, and went on and on, day after day and week after week, only stopping for food and sleep, it would take you over five years to make 353,000,000 strokes.

These people are not scattered equally all over India.

Some parts of the country are thinly populated, other parts are thickly populated. Fig. 142 is a population map of India on which each dot represents 100,000 people. By comparing this map with the physical, vegetation, and rainfall maps we find that the population is densest :

- (1) in the lowlands or slightly hilly regions ;
- (2) on the tracts of alluvium ;
- (3) both in dry and wet districts ;
- (4) where the natural vegetation has been removed and cultivated land is shown.

**Urban and Rural Population.**—Look again at Fig. 142. Compared with its size there are very few large towns in India. The population is mainly "rural," that is, the people live in the country near their fields. India is an agricultural country ; the population is densest where agriculture is most important. We shall find later that this is not true of all countries. It is not true of England and Wales (see Figs. 265 and 266).

**The Races of People in India (excluding Burma).**—The distribution of the different races of people in India is a result of the complicated history of the country. Ages and ages ago the only people living in India were very wild uncivilised peoples, which we call the Pre-Dravidian peoples. Then India was invaded by cleverer people whom we may call the Dravidians. They spread all over India and drove the wild inhabitants away to the hills and the thick forests. There are scarcely any descendants of the Pre-Dravidians left now ; the best example are the Veddas, who live in the forests in the wildest parts of Ceylon. After the Dravidians, India was invaded again and again from the north-west by clever, cultured, and educated peoples. The invaders—we may call them all together the Indo-Europeans or Indo-Aryan peoples—took possession of all the best lands, such as the fertile plain of Hindustan, and drove the Dravidians into Peninsular India, south of the Satpura line. The Satpura range of mountains formed one of the great barriers which prevented the spread of the invaders to the south. Wave

after wave of different races poured into India and settled there, often intermarrying with the people they conquered, so that to-day the peoples of India are all very mixed, and it is often difficult to say whether they have descended from the Dravidians or the later invaders. It is much easier to classify the people according to the language they speak, or according to their religion.

**The Races of People in Burma.**—Just as India was invaded again and again from the north-west, so Burma was invaded again and again from the north. But the people who poured into Burma were quite different from those who went to India. Burma was invaded by Mongol peoples—that is, people like the Chinese with yellowish or yellowish-brown skin, smooth broad faces, and straight black hair. Nearly all the people living in Burma are Mongols. As in India, the wilder peoples were driven away to the hills, one of the latest invaders and the cleverest (the Burmans) seized the most fertile lands of the river valleys. Fig. 185 shows the distribution of races in Burma. Compare it with a physical map and see how the Chins, Shans, Was, Palaungs, and Kachins, who are the less educated or less civilised peoples, live in the hills.

**The Languages of India.**—The large number of languages spoken in India is also a result of the history of the country. We can distinguish four main groups :

(a) *The Munda languages* probably represent the languages spoken by the oldest or Pre-Dravidian inhabitants of India. The languages are very curious ; long words are made by stringing together a number of short ones, so that one long word often means as much as a long sentence with us. Munda languages are only spoken by a few of the wildest of the hill tribes who live in the thick forests of the Chota Nagpur plateau.

(b) *The Dravidian languages*, once spoken over most of India, are now confined to the Peninsula (see Fig. 143). The principal ones are Tamil, Telugu, Malayalam, Kanarese, and Tulu.

(c) *The Indo-European languages*, which were introduced

by the conquerors who came from the north-west, have spread all over Northern India and a long way down into the Peninsula. There are very numerous different ones. In Baluchistan and the hills nearest the original home of the languages we find Baluchi, Pashto, and Brahui (not now spoken by many people). Going south-eastwards are Sindhi, Gujarati, and Marathi, with Rajasthani farther north ; going north-eastwards are Pahari, Lahnda, Punjabi,

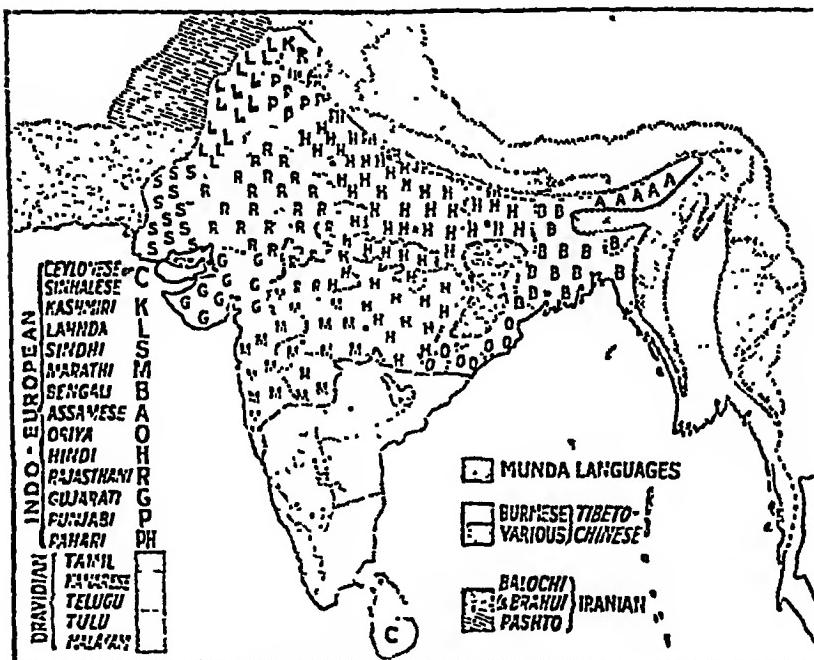


FIG. 143.—The languages of India.

Kashmiri, Western and Eastern Hindi, Bihari, Oriya, Bengali, and Assamese.

(d) *The Tibeto-Chinese languages*, which again are quite different, are the languages of the Mongol peoples. Different languages of this group are spoken by the hill tribes of the Himalayas, such as the Lepchas, and also over most of Burma, where the principal language is Burmese.

**Linguæ Francæ.**—When so many different languages are spoken in a country, it is very difficult for people when

travelling about to understand one another. It is the same when people travel from one country to another. In order that people may understand one another there are a number of "common languages," or *lingua franca*, which are spoken or understood by people although not their own language. The most important of all is English, which is spoken or understood over more than half the world. It is understood by educated people throughout India. Over

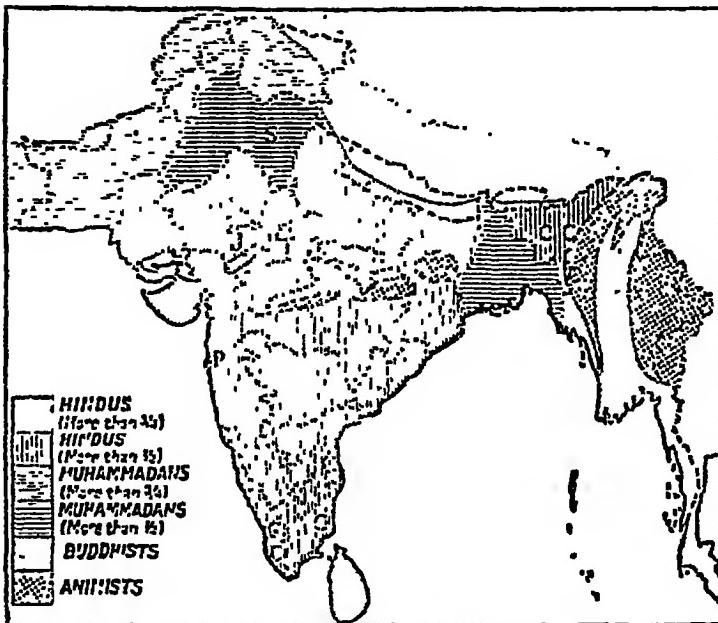


FIG. 144.—The religions of India.

the whole of Northern India and parts of Burma the common language, used in nearly all the bazaars, is Hindustani. It is really an impure form of Hindi. In Southern India and Ceylon the *lingua franca* is Tamil.

**Religion.**—More important than race or even language, there is religion. In India the lives of the people are often entirely controlled by religion. It determines their upbringing, education, customs and habits, marriage, occupa-

tion, dwelling-place, type of home, and the architecture of their towns. Here are just a few examples of the varying influence of religion. To the Hindus the cow is a sacred animal and they will not eat beef ; to the Mahomedans the pig is an unclean animal and they will not eat pork. It is forbidden for a Buddhist to take life, and he will not kill an animal for food. Early marriage is the custom amongst certain Hindus, and nearly all the girls are married before they are ten years old in certain parts of India.

In some parts of India the "purdah" system is observed which, when strictly followed, does not permit the women to be seen at all in public and prevents the menfolk from visiting the houses of other than near relatives. Wherever Mahomedans are found, their mosques with the characteristic form of architecture are found also.

We find in India that there are "religious centres"—famous places of pilgrimage or seats of learning connected with one of the religions. Thus Benares with its thousands of Hindu temples and its Hindu colleges is a centre of both the Hindu religion and the culture connected with it. Lahore is a great centre of Mahomedanism, whilst Rangoon and Mandalay in Burma and Kandy in Ceylon are centres of Buddhism. To the Hindus the River Ganges is the most sacred river in the world ; to die or to be cremated on its banks is to gain everlasting peace. Hardwar, where the Ganges leaves the mountain, is one of the most sacred places of pilgrimage.

**Distribution of Religions and Cultures.**—The principal religious sects of India are :

(a) Hindus ..	217,000,000	..	68.5	per cent.
(b) Sikhs ..	3,250,000	..	1.0	"
(c) Jains ..	1,200,000	..	0.37	"
(d) Buddhists ..	11,500,000	..	3.7	"
(e) Parsis ..	100,000	..	0.07	"
(f) Mahomedans ..	69,000,000	..	21.7	"
(g) Christians ..	4,750,000	..	1.5	"
(h) Animists ..	9,750,000	..	3.1	"

Many of the hill tribes, the backward peoples, are Animists—that is, they worship spirits which they say live in the trees or the rocks, etc. Nearly all the Buddhists live in Burma, the Burmans being Buddhists. There is another centre of Buddhism in Ceylon. The Sikhs, Jains, and Parsis are grouped round what we may call “cultural centres.” The Sikhs are mainly in the Punjab; the Jains in Rajputana and neighbouring parts of Bombay; the Parsis in Bombay.

The two greatest religions of all—Hinduism, which may be called the natural religion of India, and Mahomedanism—are widely distributed. Mahomedanism came to India with the later invaders from the north-west, and so we find it predominates in Baluchistan, North-West Frontier, Kashmir, and the Punjab. There is another strong centre of Mahomedanism in Bengal. Hinduism predominates in other parts of India. Christianity was brought by seafaring peoples, and is strongest near the coasts.

Again we notice the geographical control of the spread of religions. Mahomedanism followed along the Hindustan plain, but did not penetrate strongly in Peninsular India. Jainism and the Rajput culture, as well as the Rajasthani language, stop short at the Satpura Mountains. Fig. 144 will help you to understand the distribution of religions.

**Occupations.**—India is mainly an agricultural country. Fig. 145 shows you the relative importance of other occupations than agriculture. Although India has always been an agricultural country, it has always been noted for the cleverness and skill of its people in making cloth and

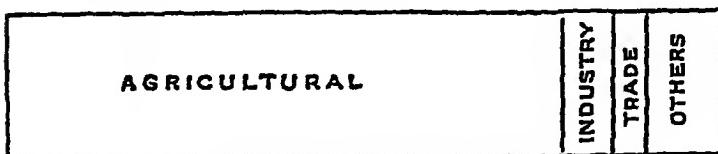


FIG. 145.—Occupations in India.

silk, working in metal and ivory and wood. But machine-made articles can be produced so much more cheaply than hand-made articles, and India is fast taking her place in the world as a manufacturing country as well as an agricultural country. We can still distinguish :

- (a) The old native industries of hand-made articles.
- (b) The newer factory industries of machine-made articles.

**Manufactures of India.** (a) *Cotton Goods.*—The most important native industry has always been the weaving of cotton fabrics. Cotton is one of the native plants of India, and though enormous quantities are produced for export, nearly half is used in the country. In some parts of India and Burma every house has its hand-loom where the women make saris for themselves or dhotis for their husbands. More important now are the great cotton factories. The most important cotton manufacturing centre is Bombay, where a quarter of a million people are employed in the cotton mills. There are also mills in the Madras Presidency and in the Central Provinces. For the manufacture of cotton goods a certain amount of moisture in the air is required. Bombay has this right amount of moisture, Karachi has not. So that, although Bombay and Karachi are both ports exporting raw cotton, only Bombay has in addition cotton mills.

(b) *Jute.*—Just as Bombay is the centre of the cotton manufacturing industries, so Calcutta is the centre of the jute mills. Jute, as you have learnt, is grown in the Ganges Delta. A large quantity is exported raw, but the mills round Calcutta and up the River Hooghly make large quantities of jute canvas and "gunny bags"—which are sacks in which paddy and other grain can be packed for transport.

(c) *Silk.*—India has long been famous for its beautiful silks, and many of the fine old towns are still noted for special kinds. But the industry is very small when compared with cotton or jute. Much of the raw silk is imported from China, but native Indian silk is also produced.

Bengal is the chief silk-producing province. Brocaded silk goods are made in Bengal, the Punjab, and Southern India ; striped silks and the famous gold brocades all over Northern India at such centres as Agra, Benares, Amritsar, Ahmadabad, and Surat. Burmese silk, made near Mandalay, is quite different but is very good.

(d) *Woollen Goods*.—India has also long been celebrated for woollen goods, especially carpets and shawls. The weaving of shawls is a typical industry of Kashmir. Carpet-making is carried on in many parts of India, but especially in the Punjab, Kashmir, and the Central Provinces. Coarse blankets are made in many parts of Northern India, where the winters are cold.

In the cotton, silk, and woollen industries native vegetable dyes such as indigo used to be used, but now cheap chemical dyes are imported.

(e) *Metal Working*.—Ironwork is another old industry of India, but the great Tata iron and steel works, on the north-eastern coalfield, are the only large modern iron-works. Many castes in India use brass for all cooking-utensils, and brass-working is an important industry in many towns of Northern India, such as Benares. Bombay and Poona are centres of silver working ; Jaipur and Delhi of gold working.

(f) *Pottery*.—The making of pottery for domestic purposes is a native or “cottage” industry all over India. Bricks and tiles are made all over Northern India.

(g) *Other Manufactures*.—There are numerous rice-mills in Burma ; wheat flour mills in the Punjab ; saw mills in Assam and Burma ; oil refineries in Burma, Assam, and the Punjab ; tobacco factories in Madras, Burma, etc., as well as sugar-mills in various parts. In Ceylon the rubber industry is important, and tea-packing in Assam and Ceylon.

#### 10. IRRIGATION IN INDIA

**Perennial Canal Irrigation**.—By far the most important type of irrigation is by means of canals which have water in them all the year round. Many of the canals are

hundreds of miles long, and the construction of them costs enormous sums of money. It is only when there is a strong and wise Government that such works can be constructed. The British Government has spent the tremendous sum of Rs. 100,00,00,000 (one hundred crores) on irrigation works in India, and 50,000,000 acres have been made fertile for the poor farmers. The most important works are in the drier parts of the great Hindustan Plain—in the Punjab, United Provinces, and Sind. Although the rainfall in these parts of the Hindustan Plain is poor, there is a good rainfall, as well as a heavy snowfall, on the Himalaya Mountains to the north. As a result the rivers which rise in those mountains are never dry, but are always bringing water down from the mountains to the plains. In some seasons of the year there is more water than at others. It sometimes happens that most water is required for irrigation when the river is at its lowest. The first stages in building a great irrigation canal are :

(1) To choose a suitable spot on the river where its supply of water can be tapped.

(2) To build across the river a wall (called a dam or weir), so that the water can collect behind to form a lake which will never be dry. In the rainy season more water will flow into this lake than is required, and it is allowed to escape over the wall. But in the dry season nearly all the water in the lake will be used for the canal.

The dam or weir from which the canal starts is called the "head" of the canal. The main canal is then cut right across the country. The slope of the canal is very, very gentle, so that the water only moves slowly, and not rapidly as it does in many rivers. Often the surface of the land slopes more rapidly than is desirable for the canal, and so the canal has to be built upon an embankment. From the main canal big branch canals are constructed. The water is actually distributed to the land through a series of small side branches called distributary canals. The amount of water passing into these small canals has to be very carefully regulated. The largest and

most recent dam is at Sukkur, on the river Indus, in the Sind. Opened in 1932, it will irrigate 5½ million acres.

Besides the great works in the Hindustan Plain, there are important canal systems in Madras and Central Burma, about which you will learn in later chapters.

**Inundation Canals.**—In Sind and in certain other

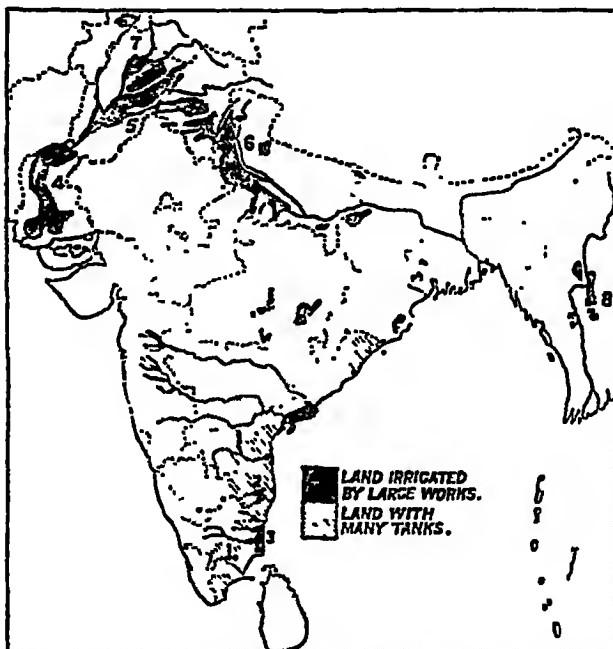


FIG. 140.—Irrigation in India.

1, 2, 3 = Madras; 4 = Sind; 5 = Punjab; 6 = United Provinces;  
7 = Peshawar area; 8 = Dry zone of Burma.

parts of India canals were constructed starting from the bank of a river. The water of the river overflows into them in the flood season, but in the hot season the canals dry up, so that they are not nearly so useful as the permanent canals. Sind now has permanent canals.

**Tanks.**—In most of the drier parts of Peninsular India mud walls are built across the valleys of small

streams, so that water collects and forms a pond or lake during the wet season. Such ponds or lakes are called tanks. When the rainy season is over, the water from the tanks can be used, but in the hot season the tanks dry up completely. In bad rainfall years the tanks may not even be filled during the rains.

**Wells.**—Although the surface of the land may be dry in the drier regions, there is often water at a short distance below the surface. This water can be reached by wells and brought up to the surface.

**Karez.**—In Baluchistan, but in no other part of India, there is a very clever system of irrigation. Long underground tunnels called karez have been constructed to reach water at the foot of the hills and to bring it out on to the alluvial plains.

Fig. 146 shows you the more important irrigated regions in India.

**Famine.**—In times past India has suffered terribly from famine. The parts which suffer most are those parts which have a moderate rainfall, but which depend entirely on "dry" crops. In bad rainfall years the crops may fail and the people be without food. Notice that famine is not to be feared in tracts irrigated by large works, but in the dry parts where irrigation cannot be carried out. The drier parts of the plateau suffer most. In the old days many thousands of people perished, but now there are railways, and food can be sent quickly from one part of the country to another.

## 11. NATURAL REGIONS

India is a very large country, and we have to divide it into a large number of natural regions. We have already noticed that the country falls into four great physical divisions. It will be simpler if we group together the natural regions according to these physical divisions. This gives us the following arrangement:

- (a) Natural Regions of the Mountain Wall.

- (b) Natural Regions of the Hindustan Plain.
- (c) Natural Regions of the Indian Plateau.
- (d) Natural Regions of Burma.

**The Natural Regions of the Mountain Wall.—**

These natural regions have one thing in common. They are all mountainous, or very hilly, or consist of high plateaux surrounded by mountains. The mountain wall does not form a single natural region, because the climate varies enormously from end to end. One place in Assam near the eastern end has the heaviest rainfall in the world ; some places near the western end practically have no rain at all. Further, the higher parts are much colder and different therefore from the lower parts.

We therefore divide the mountain wall into the following regions :

- (1) The Eastern Hills Region, comprising the eastern part of the mountain wall separating India from Burma. It is very wet, forested, and thinly populated.
- (2) The Himalayan Region, comprising the Himalayan Mountain Chain from 5000 feet upwards.
- (3) The Sub-Himalayan Region, comprising the foot-hills between the plains and the mountains, as well as the lower slopes of the Himalayas up to 5000 feet.
- (4) The Tibetan Plateau, on the far side of the Himalaya Mountains. It is the highest plateau in the world, away from the reach of the monsoon. It is an Alpine desert.
- (5) The North-Western Dry Hills cover the north-western part of the mountain wall, and form a very dry region.
- (6) The Baluchistan Plateau, the western part of the mountain wall, is a very dry plateau surrounded by hills.

**The Natural Regions of the Hindustan Plain.—**  
The great alluvial plain of Hindustan is again divisible according to climate.

- (7) The Lower Indus Valley or Sind, a very dry alluvial plain depending almost entirely on inundation canals from the River Indus.
- (8) The Punjab Plains, another very dry alluvial plain, depending almost entirely on canals from the five rivers of the Punjab.
- (9) The Upper Ganges Valley, a dry region in which

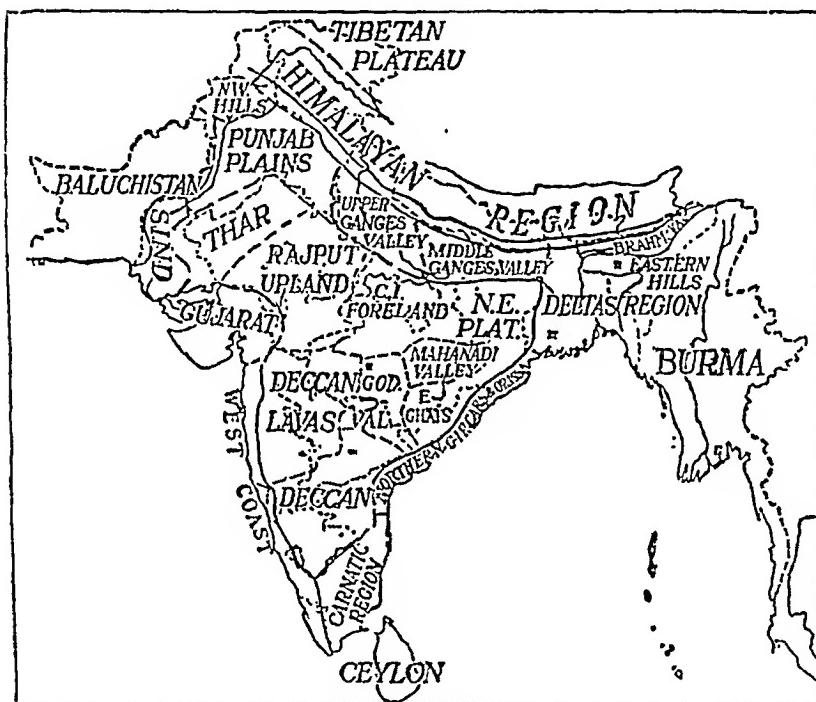


FIG. 147.—The natural regions of India.

nearly half the country depends on perennial irrigation canals from the Jumna and Ganges.

- (10) The Middle Ganges Valley, an intermediate area, with a mixture of wet-zone and dry-zone crops.
- (11) The Lower Ganges Valley, or the Deltas, a wet alluvial region characterised by wet crops, notably rice.

- (12) The Brahmaputra Valley, a wet valley much narrower than the Ganges Plain and less thickly populated.

**The Natural Regions of the Indian Plateau.—**

The whole of India south of the Hindustan Plain may be called the Indian Plateau. We might call it Peninsular India, but most people when they use that term mean only the land south of the Satpura Range. We may distinguish ten natural regions grouped as follows :

*(a) Coastal Regions round the Plateau proper.*

- (13) The Gujarat Region, dry or moderately dry, hilly in places.

- (14) The West Coast Region comprising a narrow coastal plain and the slopes of the Western Ghats ; very wet.

- (15) The Carnatic or Tamil Region comprising a broad coastal plain and an inland hilly part ; moderately wet, with the rain falling mainly in October, November, and December.

- (16) The Northern Circars Region, including Orissa, a coastal plain, moderately wet.

*(b) Regions north of the Satpura Mountain Line and sloping down towards the Hindustan Plain.*

- (17) The Thar or Great Indian Desert.

- (18) The Rajput Upland Region, dry to very dry, hilly, sloping upwards from the Thar and Punjab Plains towards the Satpura Range.

- (19) The Central Indian Foreland or Central India Plateau, dry, sloping upwards from the Ganges Plain to the Central India Highlands.

*(c) Regions of the Plateau (Peninsular India proper).*

- (20) The Decean or high southern part of the plateau, dry, somewhat barren, and thinly populated.

- (21) The Deccan Lavas Region or north-western part of the plateau, dry, but with a very fertile black soil, very suitable for cotton ; moderately thickly populated.

- (22) The North-Eastern Plateau, a complex region comprising five subdivisions : the Central Indian Highlands, Chota Nagpur Plateau, Eastern Ghats, Chhattisgarh Plain or Mahanadi Valley, and the Godavari Valley. The region as a whole has a moderate rainfall (40 to 60 inches), and is thinly peopled and largely forested. The people live mainly in the two valley areas.

**The Natural Regions of Burma.**—Burma, as we have already said, is very distinct from the rest of India and falls into seven natural regions. One of these (the Western Hills Region) is part of the Eastern Hills Region of India, and comprises the mountain wall which separates Burma from India. The other regions are :

- (23) The Arakan Coastal Strip ; very wet, hilly, very thinly populated.
- (24) The Tenasserim Coastal Strip ; very wet, hilly or mountainous, covered with evergreen forest, very thinly populated.
- (25) The Shan Plateau, a plateau of old rocks, moderately wet, thinly populated by backward people.
- (26) The Northern Hills Region, a hilly region, sloping southwards, wet or very wet, undeveloped.
- (27) The Dry Belt, a dry plain, fairly thickly populated.
- (28) The Delta Region, mainly an alluvial plain, wet to very wet, and devoted to rice cultivation ; divided into two parts by a forest-covered range of hills. Densely populated except on the hills.

**Difference between Regions.**—There are, of course, many other differences between the natural regions, which we shall see when we come to study each in detail. Fig. 147 is a map of India showing the natural regions. An attempt has been made to show where the line between two regions is marked and where there is a gradual change. Study this map very carefully. Fig. 186 shows the natural regions of Burma.

## 12. THE POLITICAL DIVISIONS OF INDIA

The great Indian Empire is ruled by the Government of India, at the head of which is the Viceroy or Governor-General. The Viceroy is assisted by a small council, so that the acts of the Government of India are always said to be by order of "The Governor-General in Council." The Viceroy and Council are advised in all matters, but especially in the making of laws, by the Legislative Assembly, a large body of men mainly elected by the people themselves in all parts of the country. Although the Government of India with its Council and Legislative Assembly is the real means of Government in India, many matters have to be referred to the Capital of the British Empire, London, where they are administered by the Secretary of State for India. As you learn from history, a great part of India used to be controlled by the East India Company. When the possessions of that company were taken over and the Government of India was formed, the proclamation declared that "all shall alike enjoy the equal and impartial protection of the law" whatever their race or religion, and that all offices in the Government should be open to all natives of India, whatever their race or creed. Education, ability, and integrity are the only qualifications required for Government service.

Since 1912 the seat of Government or Capital of India has been Delhi. For many years before that it was at Calcutta.

It would be very difficult to govern a huge area like India from one centre such as Delhi, so British India has been divided into nine major and six minor provinces. The nine major provinces of Madras, Bombay, Bengal, the United Provinces, the Punjab, Burma, Bihar and Orissa, Assam, and the Central Provinces are ruled each by a Governor assisted by a Legislative Council (elected mainly by the people); the six minor provinces are each administered by a Chief Commissioner. The six minor

provinces are the North-West Frontier, Ajmer, Delhi, Coorg, Baluchistan, and the Andaman Islands.

Then there are large areas of India, called Native States, ruled by their own chiefs (styled Maharajahs, Rajahs, etc.). Generally the ruler is advised by a political officer appointed by the Government of India, but the native ruler otherwise has complete control of his affairs. Some of the Native States are very large like Hyderabad or Mysore, others embrace only a few square miles.

The smaller Native States have political relationships with the provinces within which they lie, but the larger States (Kashmir, Hyderabad, Mysore, etc.) deal directly with the seat of Government at Delhi.

Included geographically in India are certain entirely independent States like Nepal. Quite separate in Government is Ceylon, which is an island off the south of India and only separated from it by a narrow strait.

## THE PROVINCES AND STATES OF INDIA

### 1. ASSAM

Assam has been a separate province since 1912. Its population is only  $7\frac{1}{2}$  millions, and there is still plenty of room for more people in many parts of Assam. It is ruled by a Governor with a Legislative Council. The seat of Government is Shillong, situated on the high healthy plateau but not served by railway.

**Physical Features.**—Assam falls into three separate divisions :

- (a) The Brahmaputra Valley along the north.
- (b) The Hills Region, consisting of the hills which separate Assam from Burma, and sending a broad finger westwards to form the Khasi, Jaintia, and Garo Hills.
- (c) The Surma Valley in the south, which joins on to, and really forms part of, the great Delta Region of Bengal.

Along the north of Assam lie the Himalaya Mountains, and certain tracts of Assam form part of the mountain regions.

The first two physical regions form natural regions which lie wholly within the province, and we will describe them in detail, but the Surma Valley will be described later with Bengal.

The Brahmaputra Valley in Assam is roughly 500 miles long, but only about 50 miles wide, and so is very different from the broad Ganges Plain. It is shut in between the lofty Himalayas on the north and the Assam Hills on the south. A great part of the valley has a rainfall

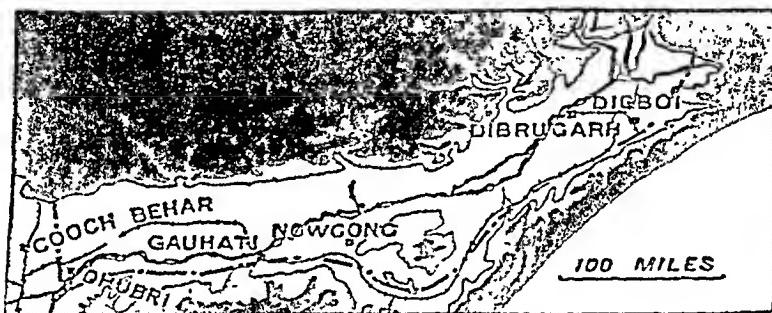


FIG. 14S.—The Brahmaputra Valley.

of more than 80 inches, but in the centre there is a drier patch. This drier part lies in the rain-shadow of the Garo, Khasi, and Jaintia Hills, which protect the valley from the South-West Monsoon. In the hot season and the rains the sky is cloudy, and the land does not get so hot as in the broad Ganges Valley. The Brahmaputra River itself is broad ; it divides and reunites again many times ; on either side there is often a waste marshy belt, but a little distance from the river are flat lands given over to rice-growing. Palm trees and villages are dotted about amongst the paddy-fields ; farther away from the river are found the gentle slopes covered with tea gardens for which Assam is famous. There are still only 150 people

to the square mile in this region, instead of 500 as we find in the Ganges Valley. Less than a quarter of the region is cultivated, whilst nearly half is waste land. Every year Bengalis come from crowded Bengal to settle; Biharis are employed in the tea gardens, and afterwards settle on the land, and so the population is growing. Two-thirds of the cultivated land is used for rice; tea and oil-seeds are the other important crops. Twelve people out of every hundred are connected with the tea industry. Remember that the tea is grown mainly for export. At

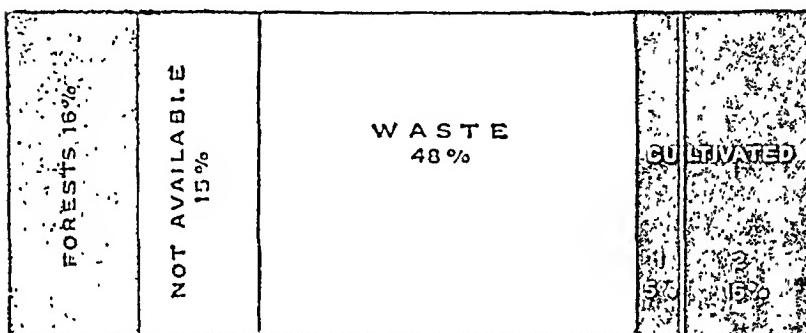


FIG. 149.—Proportion of cultivated land in the Brahmaputra Valley.

the eastern end of the region is the small oilfield of Digboi. The river is the great highway; notice how it interrupts the railways.

The Hills Region of Assam forms part of the mountain wall between India and Burma, and joins on to the Western Hills Region of Burma. Notice the names of the different parts. The hills receive a very heavy rainfall, and on the southward slope of the Khasi Hills is Cherrapunji, one of the rainiest places in the world, with nearly 500 inches of rain per year. The most important part of the region is the plateau on which Shillong is situated, and here there is a moderate amount of cultivation. Taking the region as a whole, only one twenty-fifth is cultivated, more than half is waste, and forests cover one-eighth of the whole. Many of the forests are too difficult to reach to

(b) *Mangrove Forests.*—There are certain trees which must have their roots covered by salt water at every high tide. The mangroves are the most important. We find them growing along the sea-coast where it is flat and muddy, and in the great river deltas. The mangrove forests of the Ganges Delta are called the "Sundarbans" after *sundri*, the Bengali name for mangrove.

**Useful Forest Products.**—The most valuable timber is teak, mainly from Burma. The pyinkado, or Burma ironwood, is another important tree, largely used for railway sleepers. The sal gives a good timber also. The pine trees of the mountains yield fine soft wood, as well as timber and resin, but the forests are difficult to reach. Many of the poorer kinds of wood in all parts of India are used for firewood. The mangrove forests are found in deltas where no other wood is available, and are therefore valuable for fuel. Bamboo is really a very large grass and grows in many parts of India, but especially in the Monsoon Forests.

is used for very many purposes. Another forest product is a sticky substance produced by insects living in the trees.

The method of working the timber of the forests is interesting. It is cut in the dry season and dragged to the streams by elephants or buffaloes. When the rains come the streams rise, and the logs are floated down to the bigger rivers. These logs are joined together to form "rafts" and floated down the rivers to saw mills, where the wood is cut up into planks.

#### 7. AGRICULTURE

India is essentially an agricultural country. Nineteenths of the vast population depend on agricultural pursuits for their existence. Despite the population of over 300,000,000, there is still a surplus of food grains available for export. The following are some of the principal crops

*Cotton* is grown mainly on flat, alluvial land where there

## 2. NEPAL

Although Nepal is a kingdom quite independent of

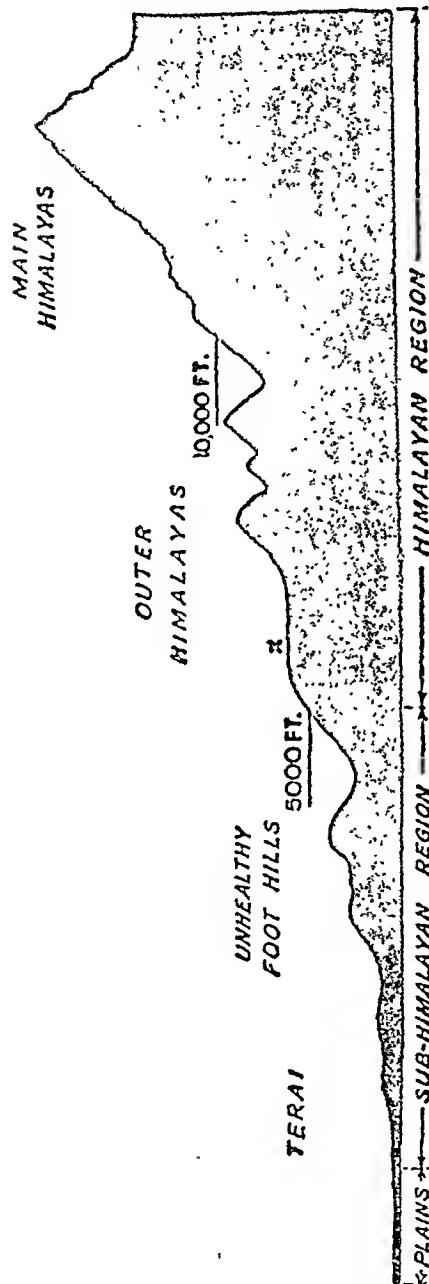


FIG. 151.—Section through the Himalayas.  $\times$  = lowest healthy mountains where the hill stations are built.

India, we will consider it next, because it lies to the north of the Ganges Plain, and in Nepal we can learn something more about the mountain wall which guards India on the north. The ruling race in Nepal is the race of the Gurkhas, fine brave men who make good soldiers. Many of them volunteer for service in the British Army. For over a century there has been peace and good-will between Nepal and India. Nepal stretches for 500 miles along the Himalayan Chain. To the north lies the plateau of Tibet, to the south is the Ganges Plain. Nepal falls into two natural regions, the Himalayan Region and the Sub-Himalayan or Sub-Montane region.

The Himalayan Region includes roughly all the land over 5000 feet. We can divide the main Himalayan Region into two parts: the

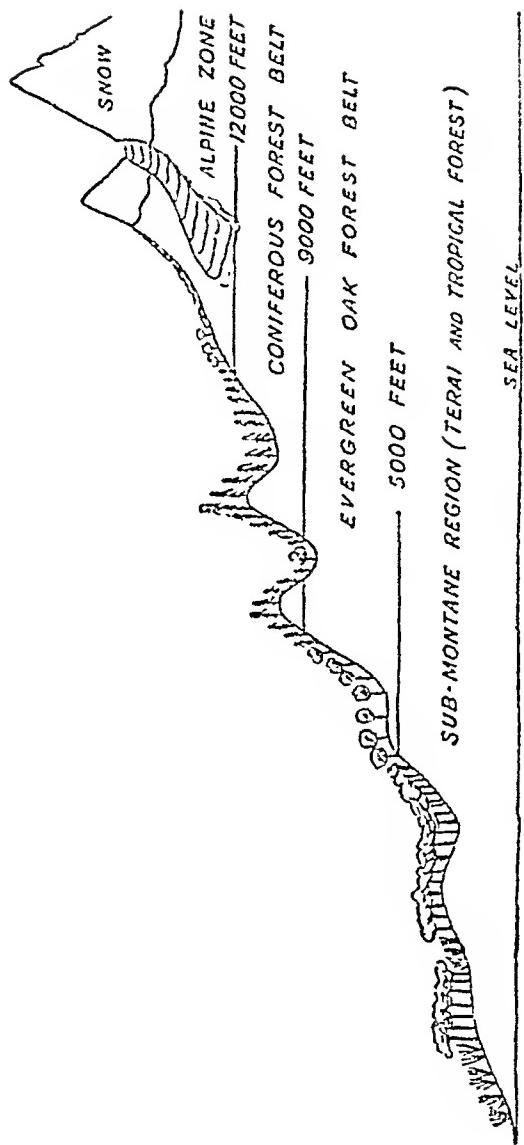


FIG. 152.—Vegetation zones of the Eastern Himalaya.

Main Himalayan Range and the lower or outer Himalayas. This part of the Himalayas catches the full force of the South-West Monsoon and the rainfall is very heavy—more than 100 inches in the east. As we go westwards it gets less and less because the monsoon wind has to blow great distances across the land before it reaches the mountains. But everywhere it is good ; even at Simla it is 63 inches. Standing on the mountains, one can see the clouds rolling up from the sea in the Bay of Bengal and enveloping the mountains in a thick white mist.

The Himalayan Region can be divided into four belts, according to vegetation and height above sea-level :

- (1) Evergreen Oak Forest Belt, 5000 to 9000 feet.
- (2) Coniferous Forest Belt, 9000 to 12,000 feet.
- (3) Alpine Belt, 12,000 to 16,000 feet.
- (4) Snow, 16,000 feet to the top of the mountains.

Although the forests are dense and contain many different trees, they are too inaccessible to be of great commercial value at present. It is difficult to get into the mountains and still more difficult to work the timber. In the Alpine Zone the ground is covered with Rhododendrons, often forming dense thickets, but the higher we go the poorer the vegetation becomes, and much of the ground is covered only with tufts of grass and mountain flowers. At about 16,000 feet we pass the "snow-line," above which the heat of summer is not sufficient to melt the snow which falls during the rest of the year, and so there is always snow.

There are very few people in the Himalayan Region. They live in small villages, widely scattered. The villagers clear a piece of jungle and grow just enough food to enable them to live. They belong to various hill tribes, mostly of Mongolian races. One of the most important peoples is the Nepalese, and their language, Nepali, is used as a *lingua franca* in many parts of the hills. The rivers of the hills are rushing, roaring torrents, occupying deep V-shaped valleys, and many of them rise from glaciers in the higher parts of the mountains.

**The Sub-Montane or Sub-Himalayan Region** lies between the broad cultivated plains of the Ganges and the Himalayan Region, extending to a height of 5,000 feet in the Himalayas. It can usually be divided into two strips:

(a) The part nearer the plains, often built up of sand and stones washed down from the hills, is only slightly above the level of the plains. It is often covered with coarse tall grasses, and is known as the Terai.

(b) The part nearer the mountains consists of a belt of hills, usually covered with forest, damp and unhealthy. There are large areas of valuable sal forest.

Cultivation is gradually extending into the Terai, which is being drained, cultivated, and rendered more healthy, and so the population increases.

The principal town of Nepal, Katmandu, is situated in a rich valley amongst the hills. Nearly a quarter of all the inhabitants of Nepal live in this valley.

Nearly all the exports and imports of the kingdom of Nepal pass through India. More than one quarter of the whole of India's foreign overland trade is with Nepal.

### 3. KASHMIR

Kashmir is a large native state, situated amongst the mountains of North-Western India. It is ruled by the Maharaja of Kashmir and Jammu, whose capital is at Srinagar.

The greater part of Kashmir lies in the Himalayan region, but the Himalayas are somewhat different here from what they are in Nepal. The north-eastern corner of the state lies on the Tibetan Plateau, whilst the south forms part of the Sub-Himalayan Region.

**The Himalayan Region.**—In the east, that is in Nepal or Sikkim, the Himalayan Range is comparatively narrow. But towards the west, in Kashmir, it is much broader, and four great parallel ranges of mountains can be distinguished :

The Muztagh-Karakoram Range.

The Inner Himalayas or Zanskar Range.

The Middle Himalayas or Pangi Range.

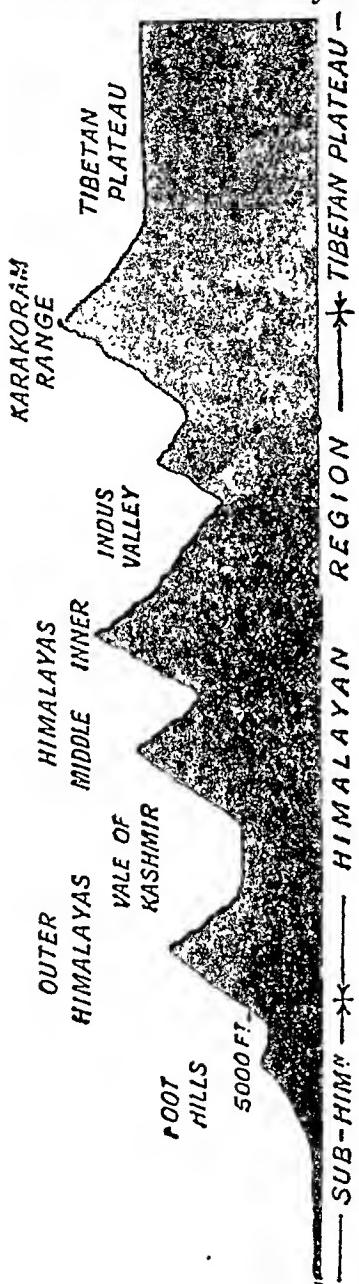


FIG. 153.—Section through the Himalayas of Kashmir.

The Outer Himalayas or Pir Panjal Range.

The Muztagh-Karakoram Range is the highest of all, and there are many great peaks more than 25,000 feet, of which K<sub>2</sub> or Mount Godwin Austen, is the highest, and probably the second highest mountain in the world. This great chain of mountains completely shuts off the bleak Tibetan Plateau beyond. One difficult gateway or pass—the Karakoram Pass—crosses the range and is the road from Leh to Tibet.

The Inner Himalayas also form a great wall, with many peaks more than 20,000 feet high.

The Middle Himalayas are not quite so high, but many peaks are more than 15,000 feet high.

The Outer Himalayas have an average height of 14,000 to 15,000 feet. Though the peaks are not much more than half the height of Mount K<sub>2</sub>, it is this range, with its snowy crest, which the dwellers in the plains can see.

The Indus River rises in the Tibetan Plateau, and for a long distance flows between the great Karakoram Range and the Inner Himalayas. The monsoon is not felt on the Tibetan Plateau; in reality it is the Inner Himalayas which prevent it being felt, and so the upper Indus Valley, around the town of Leh, is very dry. After the town of

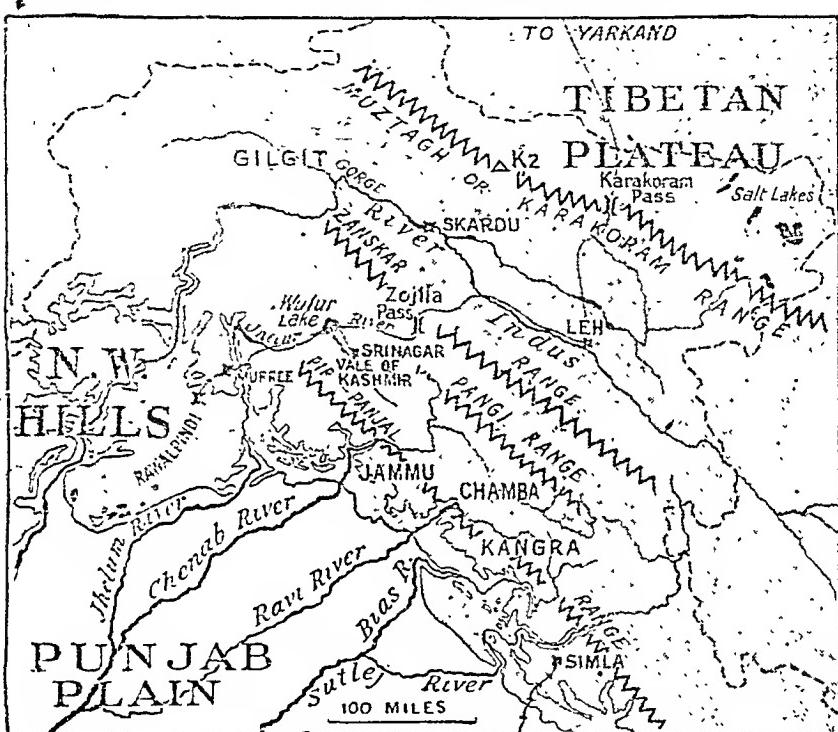


FIG. 154.—The mountains of Kashmir.

Skardu, the Indus passes through a tremendous gorge, is joined by the Gilgit, and then turns southward, then westwards again, and finally southwards till it cuts its way through the mountains to the plains. Between the Middle and Outer Himalayas is a valley different from most of the mountain valleys. It is broader and has a

lake in it (Wular Lake). This valley is the Vale of Kashmir, and is one of the most beautiful valleys in the world. The river draining it is the Jhelum, on which is situated Srinagar, the principal town of Kashmir.

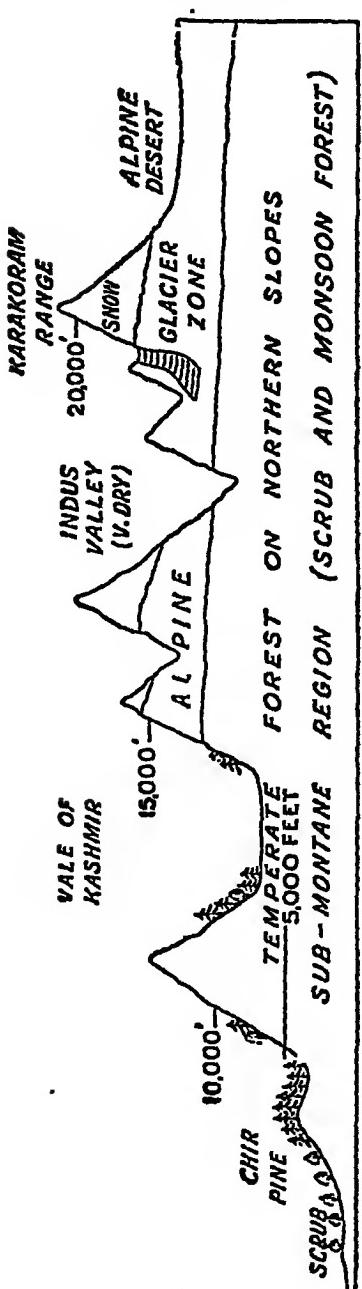


FIG. 155.—Vegetation zones of the Western Himalays.

The rivers of the Punjab Plains—the Chenab, Ravi, Bias, and Sutlej—have cut through the Outer Himalayas and some of them through the Middle Himalayas, but only the Sutlej, which rises in Tibet, cuts right through.

Note carefully on the map the few and difficult passes through the mountains—one from Srinagar across the Zojila Pass to Leh, and then to Yarkand in Tibet. Another pass is the Shipki Pass.

The forests are usually on the northern sides of the mountains, where they have more shade, so that the snow remains longer and the moisture is not dried up by the sun. The southern side of the hill is often a bare stony slope, or covered with short grass and bushes. There are few people in the mountain regions, and often they have to grow their crops in

tiny fields on the hillsides. Below 8000 feet the most important crop is maize, but wheat can also be grown to this level. Buckwheat is grown on the poorest, stony soil, whilst rice is grown in tiny fields at the bottom of valleys. The little rice-fields are carefully levelled and water brought to them in little canals. The Kashmiris live in the more sheltered valleys, but in the wilder parts, like the Indus Valley, the only inhabitants are wandering shepherds.

The hill states in the northern part of the Punjab are very similar to Kashmir in general features.

Of the towns in this region there is Srinagar in the Vale of Kashmir. Leh and Skardu in the Indus Valley.

The Sub-Himalayan or Sub-Montane Region is much drier in the west than it is in the east. The strip nearest the plains is usually covered with poor monsoon forest or scrub. The most useful tree is Chichra or Dhak (*Butea*), which makes good firewood, and a lot of bamboo is obtained. The strip nearest the mountains, from 3000 to 5000 feet, is less unhealthy than in the wetter east. It is also forested and the Chir pine is common. It is just where the rivers leave the Sub-Himalayan Region to enter the plains that their water is "tapped" for irrigation, and so there is a line of irrigation works on the borders of this region. In the region itself the rainfall is from 30 to 40 inches, and so dry crops can be grown without irrigation. Wheat and maize are the most important, but gram and millet are also grown. The scrub forests are gradually being cut down and cultivation extended.

The Tibetan Plateau.—North of the Karakoram Range there is a barren, bleak upland with scarcely any vegetation—a dry sandy waste with salt lakes scattered over its surface. The total precipitation (rain and snow) is only about 3 inches a year, but enough to keep most of the plateau covered with snow for many months together. This is part of the great Plateau of Tibet; only a small fragment comes within the borders of Kashmir. In the cold weather it is cold and barren, but in the hot weather it is almost worse, for the air is so thin that the sun shines

down and makes the rocks too hot to touch, whereas it may be freezing in the shade. At night it gets very, very cold. The region is practically uninhabited; a few traders bring salt and borax from the shores of the salt lakes to exchange for Indian goods in the Punjab bazaars. An important beast of burden is the Yak, an animal rather like a bullock, with a large hump and long hair. The rivers of this region drain northwards into a region of inland drainage.

#### 4. THE NORTH-WEST FRONTIER PROVINCE

The North-West Frontier Province is one of the smaller provinces of India, and lies mainly between the Punjab and the Afghan Frontier on the western side of the Indus. It consists of three British Districts and a large tract of "tribal territory" lying between them and the frontier. The tribal territory is inhabited by wild hill tribes who are left to themselves unless they become restless and attempt to raid the people of the plain. The whole of the province forms part of a single natural region, which may be called the North-Western Dry Hills Region. Some of the adjoining districts of the Punjab belong to the same natural region.

**The North-Western Dry Hills Region.**—This region comprises nearly the whole of the North-West Frontier Province (on the west of the Indus) and the Punjab districts of Jhelum, Rawalpindi and Attock (east of the Indus). Everywhere the rainfall is small and never exceeds 30 inches. The tract on the west of the Indus consists of a series of three plains—Peshawar, Bannu and Dera Ismail Khan—divided from one another by the low hills of Kohat and offshoots of the frontier range. The Indus Valley itself is a fine tract, but the harvests vary greatly with the extent of the river floods. The Vale of Peshawar is highly irrigated and well wooded. Where irrigated the Bannu Plain is fertile, but elsewhere is dry and barren. The plain of Dera Ismail Khan is a clay

desert, but in good rainfall years becomes grass covered. These plains have very hot summers and very cold winters. To the west of the three plains lie the barren treeless hills inhabited by the wild frontier tribes. In the more sheltered valleys are little villages, and near by the hill-slopes may have sufficient grass for sheep to be kept. The region is almost outside the influence of the monsoon and most of the scanty rain falls in the cold season. The

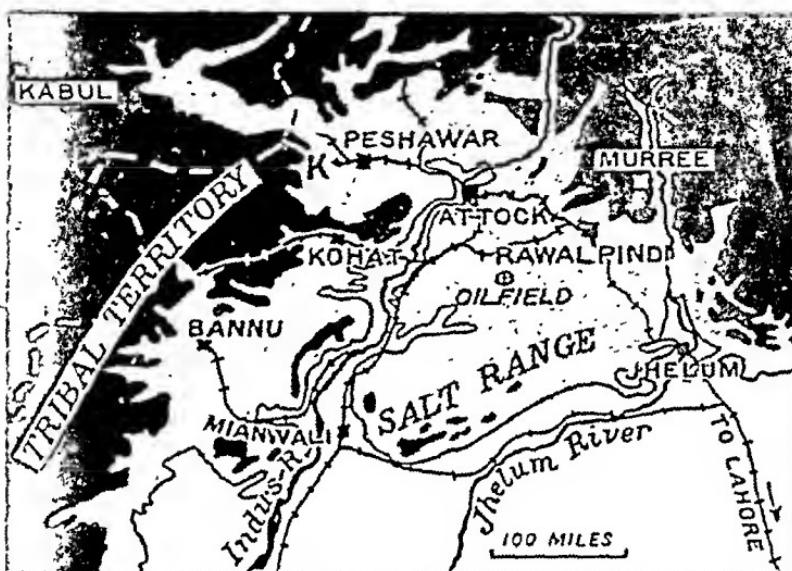


FIG. 156.—The dry hills region of the north-west.

*Land over 1000 feet, dotted; over 3000 feet, black.*

irrigated plains of Peshawar and Bannu are thickly populated and much wheat is grown. Another crop is gram. Millet is grown as a dry crop.

Above Peshawar lies the famous Khyber Pass, the gateway to Afghanistan. A wonderful mountain railway now threads its way through the narrow pass. Peshawar is the most important town of the province, it is the centre of the irrigated land, and controls the route through the Khyber Pass.

### 5. BALUCHISTAN

Baluchistan lies outside the mountain wall of India and outside the influence of the monsoon (see Fig. 157). It is a very dry plateau. It includes several British Districts (the most fertile parts), the large native state of Kaalt and

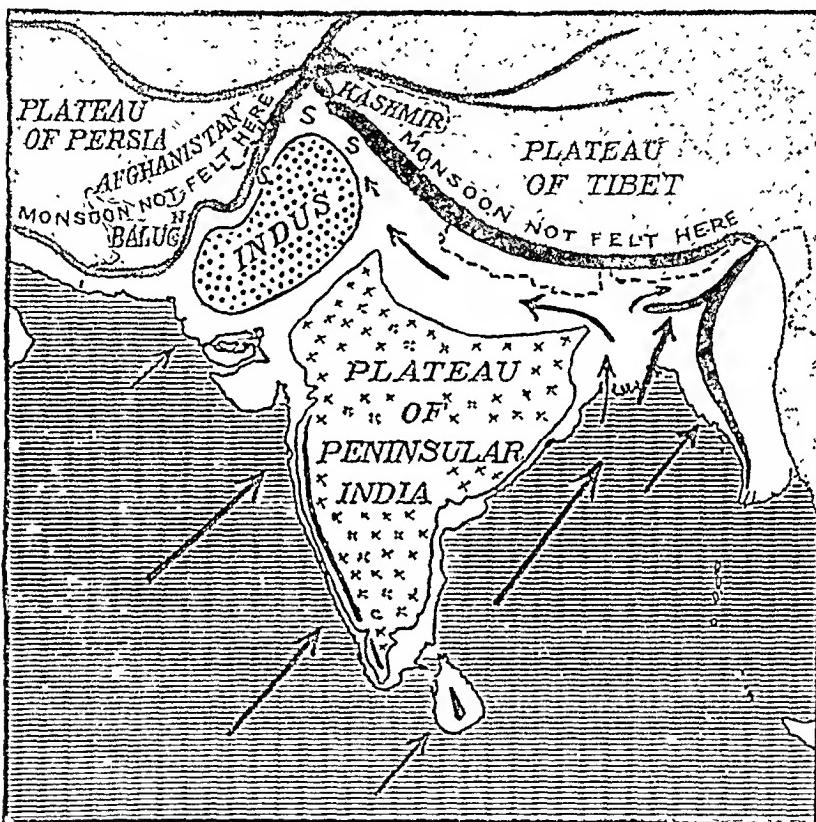


FIG. 157.—The monsoon regions of India.

a number of smaller states. The whole of Baluchistan forms one natural region. It is a plateau with a very irregular surface, averaging from 1000 to 3000 feet high, and cut off from India by the Sulaiman Range. The rainfall does not usually exceed 8 inches in a year; there are no large rivers which can be used for irrigation, and the

rain falls mainly during storms in the cold season. Baluchistan is very hot in the hot season and very cold in the cold season. Except near the coast, it forms an area of inland drainage. The rivers flow into shallow lakes which

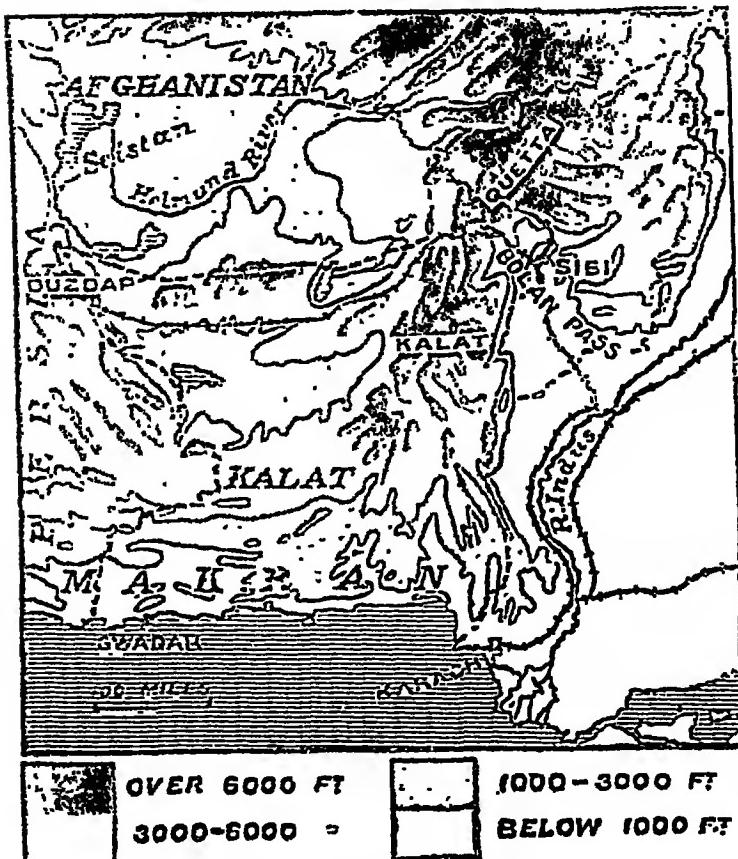


FIG. 158.—Map of Baluchistan.

often dry up in the hot weather. In this barren country there are only six people per square mile—less than in any other Province or State of India. The people are of three principal races—Brahui, Biluchi, and Pathan. They are

nearly all nomads moving about with their herds of sheep, goats, horses, cattle, and camels. In summer they live in shelters made of branches, or in tents made of goats' hair matting. In winter they live in mud huts in villages. A little land is irrigated by the curious "Karez" or by flood waters from the rivers. The principal crops are millet, wheat, and fodder. Along the sea-coast there are a few fishermen, but a little way away from the coast dates provide food for man and beast for most of the year. There are really no towns in Baluchistan. The Bolan Pass is the easiest route from Baluchistan to India, and the British town of Quetta lies at the head of the pass. Another British station is Sibi. Across the deserts are numbers of old camel caravan routes. One of these, running along the north of the country to the Persian border, has now been replaced by a railway.

#### 6. THE PUNJAB

Although it lies in the dry north-west, the Punjab is one of the important provinces of India. It has benefited enormously by the great irrigation works carried out by the Government. Punjab means "five waters" and the Punjab is, strictly, the land of the five rivers—the Jhelum, Chenab, Ravi, Bias, and Sutlej. But the province, which extends beyond this area, includes the land between the Jhelum and the Indus, as well as part of the land between the Sutlej and the Jumma and part of the Himalayas. Included in the province are several native states, and the whole is larger than the United Provinces and nearly as large as the Madras Presidency. The population is roughly 25,000,000.

The greater part, including the most important lands, of the Punjab forms part of the great plain of Hindustan and will be described under the name of the Punjab Plain. In the north-west is a dry plateau or hilly region which forms a part of the North-West Dry Hills Region. The north-eastern part includes portions of the Himalayan and

Sub-Himalayan Regions, whilst the south-east borders the Thar Desert.

The North-Western Dry Hills Region includes most of the Punjab lying between the Jhelum and the Indus—the districts of Jhelum, Rawalpindi, and Attock. It is a dry sandy plateau, bounded on the south by the Salt Range. The most important crop is millet, which depends mainly on the scanty rainfall. There is an oil-field near Attock, and salt is mined in the Salt Range. The principal town is Rawalpindi, at the foot of the Himalayas, from which a road runs to the hill station of Murree and to the heart of Kashmir. Notice, too, the important position of Rawalpindi in connection with railway routes.

The Himalayan and Sub-Himalayan Regions.—For a general description of these regions see under Kashmir. Only the north of the Punjab projects into these regions. On a spur of the Himalayas, near the plains, lies Simla, the seat of government in the hot weather. It is 7000 feet above sea-level and reached by a wonderful mountain railway. Where the great rivers of the Punjab leave the Sub-Himalayan Region are the great irrigation works, where the water of the rivers is tapped and directed into the irrigation canals. The Punjab as a whole is very short of timber, and efforts have been made to work the fine timbers of the Himalayas. The most valuable trees are the deodar and the blue pine. The chir pine is also used. The timber is floated down to saw-mills on the plains.

The Punjab Plain is a broad alluvial plain without a hill at all. It slopes almost imperceptibly south-westwards. South of the Sutlej the land rises gradually and fades away into the Thar Desert. Five rivers thread their way across the plain—the Jhelum, Chenab, Ravi, Bias, and Sutlej. Eventually they all join to form the Panchnad, which in turn joins the Indus. In the dry season the rivers are shallow and slow, but in the rainy season, when the warm sun has melted the snows on the Himalayas and the monsoon rains are pouring down on the Himalayan slopes,

the rivers become rushing torrents often miles wide. The rush of water does not always follow the same channel.

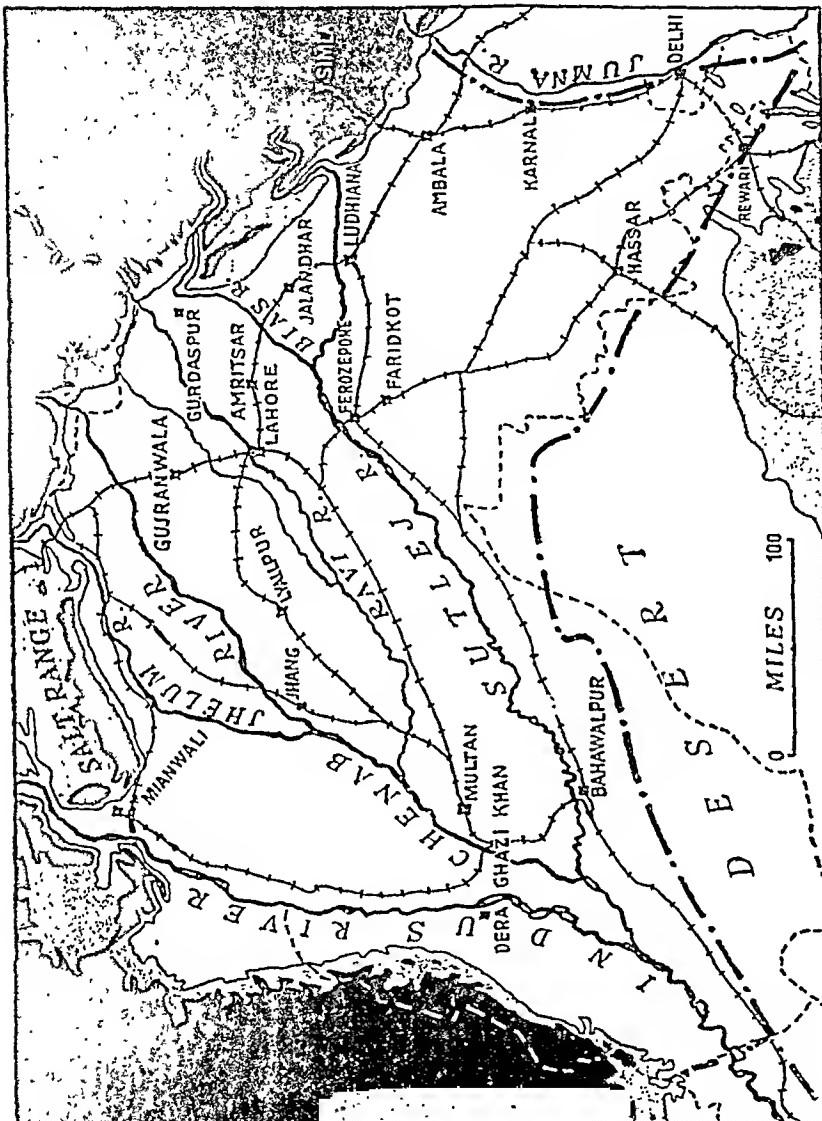


FIG. 159.—The Punjab Plains.  
Land over 1000 feet, dotted; over 2000 feet, black.

The river may leave its old bed and in a single night destroy miles of fertile fields. The whole region is very dry ; it is driest in the south-west, where the rainfall is

less than 5 inches. The extremes of temperature between the hottest and coldest months should be noted.

The Punjab Plain can be divided into three parts :

(a) The North-Eastern Plain. This is the wettest part—near the foot of the Himalayas. There are numerous wells for irrigation in this region, but dry crops may also be grown without irrigation.

(b) The South-Western Plain is so dry (5-10 inches) that it is practically impossible to grow anything without irrigation.

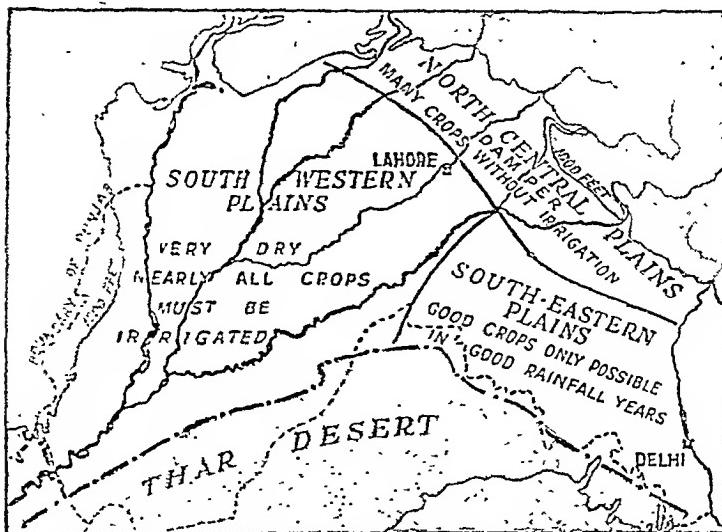


FIG. 160.—The three divisions of the Punjab Plain.

(c) The South-Eastern Plain, where the rainfall is usually from 20 to 30 inches but varies greatly from year to year. In good rainfall years many dry crops can be grown ; in bad years none.

More than half the crops depend upon irrigation. There are six important systems of Government Canals.

(1) The Western Jumna Canal takes its water from the River Jumna near where it leaves the mountains and waters the south-east of the plain.

(2) The Sirhind Canal is an old system taking its water from the Sutlej River and also watering the south-eastern plain.

(3) The Upper Bari Doab Canal takes its water from the Ravi River, where the Ravi leaves the mountains.

(4) The Lower Chenab Canal is one of the largest of the irrigation works in India. A great weir was built across the River Chenab at Khanki.

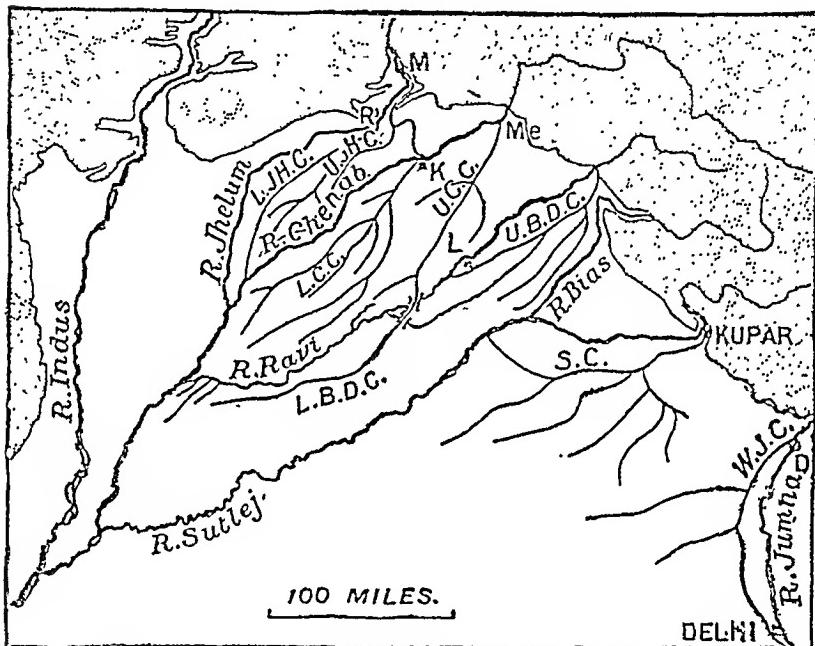


FIG. 161.—The Punjab canals.

(5) The Lower Jhelum Canal takes its water from the Jhelum.

(6) The Triple Project or Upper Chenab-Lower Bari Doab Canal System is one of the cleverest examples of canal irrigation that exists. The Upper Chenab Canal takes its water from the Chenab at Merala, near the foot of the Himalayas. The main canal is carried across the Ravi River by an aqueduct or "water bridge" and then becomes the Lower Bari Doab Canal. But when this

scheme was arranged it was found that so much water would be taken by the Upper Chenab Canal that none would be left for the Lower Chenab Canal. And so the

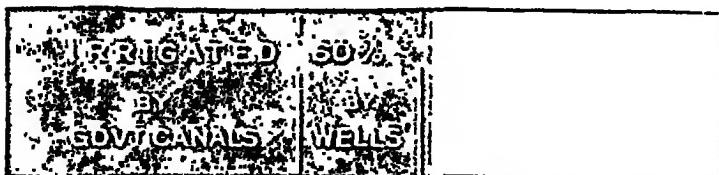


FIG. 162.—Proportion of crops irrigated in the Punjab.

Upper Jhelum Canal was built to bring water from the Jhelum to the Chenab at Khanki to help fill the Lower Chenab Canal.

As a result of irrigation many parts of the Punjab are "double cropped." Wheat, the most important crop, covers nearly a third of the area. It is reaped in spring; millet is often grown on the same ground and reaped in autumn. Wheat and millet, together with maize, form the staple food of the people. An excess of wheat is available for export and is sent to Europe through the port of Karachi. Another crop is barley. Oil-seeds are

RICE 3%	WHEAT 28%	BARLEY 4%	MILLET 12%	OTHER FOODS 19%	OIL SEEDS 8%	COTTON 15%	FODDER 12%	OTHERS 1%
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FIG. 163.—Crops of the Punjab Plain.

grown mainly for export. By far the most important crop not grown for food is cotton. On the irrigated land the long-stapled American cotton is grown and exported through Karachi. The Punjab being a dry region, much fodder is grown to feed the cattle used in ploughing.

The majority of the people are engaged in agriculture.

In the old days the cultivators suffered severely from raids of war-like tribes of the hills, and so lived together in villages for protection. They still live together in small villages scattered over the plains. The huts are of mud or mud and wattle, and the roofs of the huts are flat, for there is little rain to run off. There are very few large towns.

*Lahore* is an old historic city and an old capital, and is now the centre of government of the Punjab. It forms one of the collecting centres for the rich northern parts of the plain.

*Amritsar* is another centre near by. It is the holy city of the Sikhs and a busy trading town, and manufactures carpets. It suffers, however, very badly from fever.

*Multan* is the natural centre of the dry south-western plain. Much of the trade to Karachi passes through Multan, which has long been a busy market town. Afghan traders visit the town and exchange their raw salt, spices, and fruits for piece goods.

*Gujranwala* and *Ludhiana* (with cotton mills) are other centres in the northern part of the plain, whilst *Hassar* and *Jind*, and still more important *Patiala*, are in the south-east.

#### 7. DELHI

*Delhi*, the capital of India, lies between the Punjab Plain and the Ganges Plain. The district around has been constituted a small province, separate from the Punjab and the United Provinces. Delhi is a large city of 300,000 inhabitants ; it owes its importance largely to its position. From Delhi any place in the plain, either of the Ganges or Indus, is easily reached. In days gone by, when India was invaded from the north-west, the invaders had to pass by Delhi, because they were shut in by the Himalaya Mountains on the north and the desert on the south. In the old days the land routes of the north-west joined the water routes down the Jumna and Ganges. In modern days Delhi has become a railway centre. The cotton of

the surrounding irrigated lands finds its way to the cotton mills of Delhi. At a convenient distance to the north are the healthy heights of the Himalayas, on a spur of which Simla has been built.

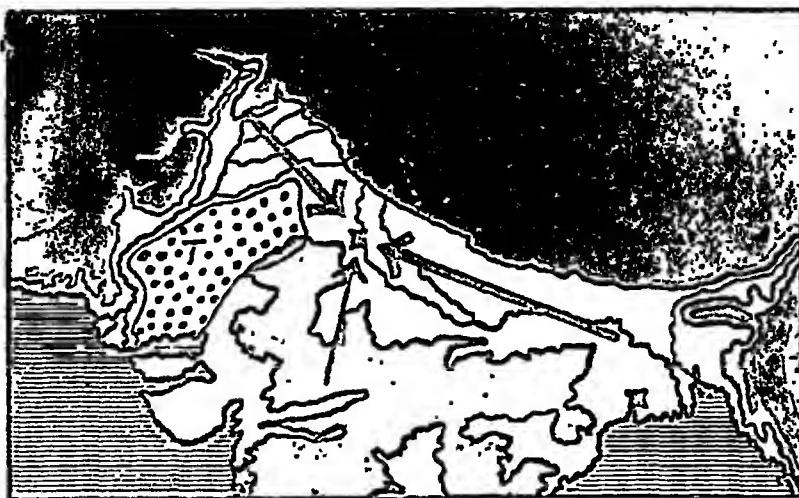


FIG. 164.—The position of Delhi.

T = The Thar Desert. Land over 1000 feet, dotted; land over 3000 feet, black.

## 8. THE UNITED PROVINCES

The United Provinces of Agra and Oudh have a smaller area than the Punjab, but have nearly twice as many people. The population is denser than in any province of India except Bengal. Yet a large part of the United Provinces has a rainfall of less than 40 inches, and their prosperity is largely due to the great irrigation works. The north-western part of the United Provinces stretches into the Himalayan and Sub-Himalayan Regions (compare the Punjab), and a small strip along the south forms part of the Central Indian Plateau. But the largest part of the Provinces lies in the great Ganges Plain. The area west of Allahabad receives less than 40 inches of rain in a

year, and so forms a natural region which we may call the Upper Ganges Valley or Dry Belt. The region east of Allahabad forms half of the Middle Ganges Valley, of which the other half lies in the Province of Bihar and Orissa.

**The Himalayan Region.**—For a general account of this region reference should be made to the details given under the State of Nepal. The lower hills, in the Sub-Himalayan Region, are unhealthy, and so a number of hill stations have been built on the most accessible parts of the Himalayan Region. Examples are Mussoorie and Naini Tal.

**The Sub-Himalayan Region.**—It is in the United Provinces that great extensions of cultivation have been made in recent years into the Sub-Himalayan Region. Dehra Dun is one of the headquarters of the Forest Department in India. A famous and sacred place is Hardwar, where the Ganges leaves the mountains. A line of towns has sprung up on the borders of this region and the Ganges Plain—like frontier towns from which the cultivators have attacked the unhealthy foothills. Examples are Saharanpur, Pilibhit, Kheri, etc.

**The Upper Ganges Valley**, like the Punjab Plain, is a vast plain without a hill. Running roughly through the centre from north-west to south-east is the Ganges; marking roughly its south-western border is the Jumna. The region consists therefore of the Ganges-Jumna Doab and a large stretch of country north-east of the Ganges. The whole plain slopes very, very gently from Delhi (700 feet above the sea) to Allahabad (400 feet). The plains are cold in the cold season, but get very hot in the hot weather, though not quite so hot as the Punjab Plains. Since the rainfall is nearly everywhere less than 40 inches, it is necessary to irrigate the land. The Ganges-Jumna Doab is especially well served by irrigation canals, and more than 50 per cent. of the crops are grown on irrigated land. In the Upper Ganges Valley there are four large canal systems:

(1) The Eastern Jumna Canal, which takes the water from the Jumna River near Faizabad, just where the river leaves the mountains.

(2) The Agra Canal, which takes the water from the Jumna River just below Delhi.

(3) The Upper Ganges Canal, which takes the water from the Ganges near Hardwar, where it comes down from the Himalaya Mountains.

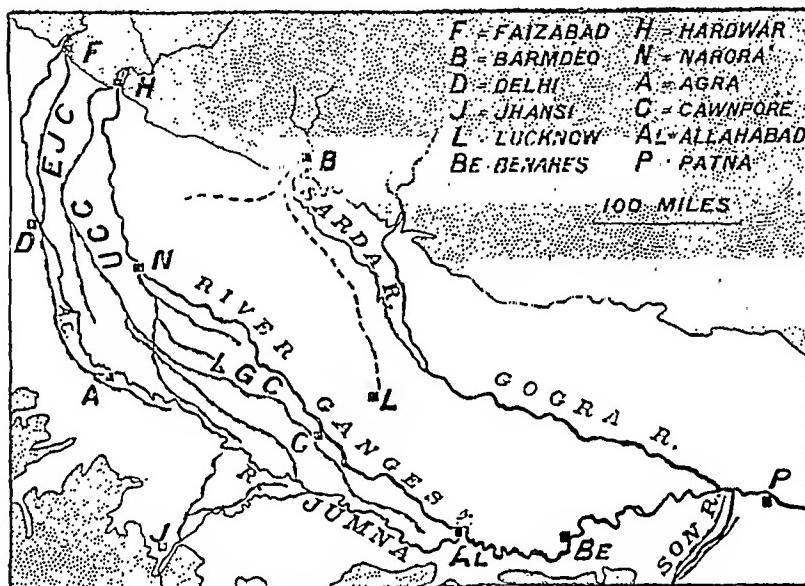


FIG. 165.—The irrigation canals of the United Provinces.

(4) The Lower Ganges Canal, which takes the water from the River Ganges at Narora.

(1), (3), and (4) water the Doab; (2) waters the land south of the Jumna. A big new scheme to use the water of the River Sarda near Barmdeo, and to irrigate the country from there to Lucknow, is now in course of construction. North of the Ganges, too, there is much irrigation from wells and tanks.

Of the whole Upper Ganges Plain more than two-thirds is cultivated, and only 15 per cent. is waste land. There

are no forests at all. The most important crops are wheat, barley, and rice, all grown on irrigated land; whilst millet is the most important dry crop. Everywhere wheat is more important than rice, and in some of the western districts no rice is grown at all. Maize, gram, cotton, fodder, and sugar occupy considerable areas. The cotton

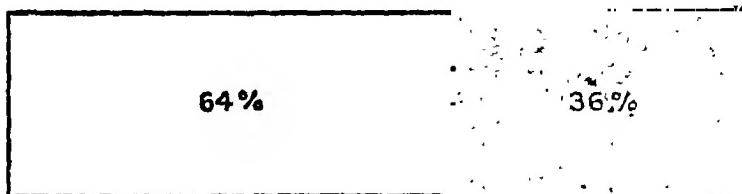


FIG. 166.—Proportion of crops irrigated in the United Provinces (Upper Ganges Valley).

grown on the irrigated land is the valuable long-stapled American cotton. Nine out of every ten people in this region are engaged in cultivation, and live in small villages in huts of mud and wattle. Only one person in ten lives in a town. Although the Upper Ganges Valley is so densely populated, there are only fourteen cities with more than 50,000 people. Of the famous old towns Lucknow, Allahabad, and Muttra are now the most important.

*Lucknow* is an old capital and still the largest town in the province, though it is getting smaller. It is a railway centre.

*Allahabad*, situated at the junction of the Jumna and Ganges, is an important place of pilgrimage. Now that railways have supplanted river routes, it has become a great railway junction and a collecting centre.

*Muttra* is an old religious centre.

*Farrukhabad*, on the Ganges, is an example of a place which used to be important owing to its situation on the great waterway, but the railways have left the town alone and it is rapidly declining.

Of the more modern or progressive cities there are :

*Cawnpore*, collecting centre and railway junction with numerous manufactures of its own.

*Micerut. Moradabad. Agra. Bareilly, and Aligarh. all of*

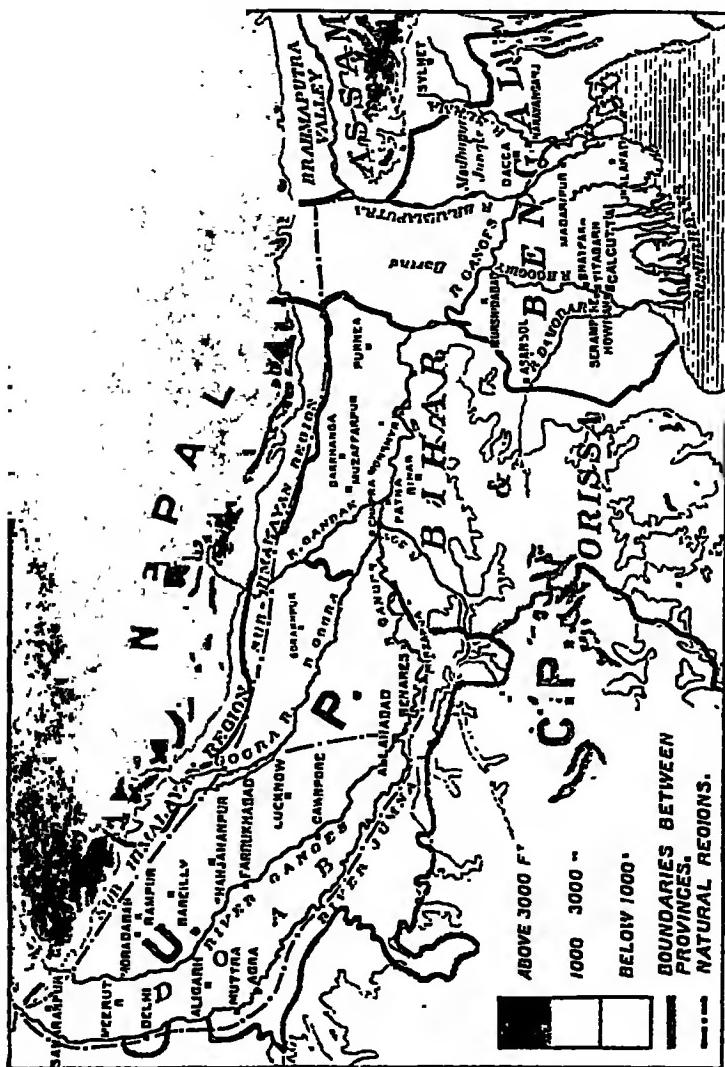


FIG. 107.—The Ganges Plain.

which are growing centres of rich parts of the region.  
Notice the railways of the region.

The Middle Ganges Valley is a natural region lying partly in the United Provinces (east of Allahabad) and partly in Bihar. It is damper than the Upper Ganges Valley, and irrigation is less necessary. The wet-region crop, rice, gradually becomes more important than wheat. When compared with the Upper Ganges Valley there is more rain and a smaller annual range of temperature. We shall describe the region in greater detail under Bihar and Orissa. Taking the part which lies in the United Provinces, *Benares* on the Ganges is the largest town; an ancient centre of Hindu culture and a very sacred place of pilgrimage. *Fyzabad* is a neglected river port, but *Gorakhpur* is now the great collecting centre and railway centre.

Along the north this part of the United Provinces borders Nepal, and a small strip of the United Provinces really lies in the Sub-Himalayan Region. There is a line of towns along the border, from which cultivation has been extended right to the Nepal frontier.

#### 9. BIHAR AND ORISSA

The Province of Bihar and Orissa has only been in existence since 1912, and was partly carved out of Bengal. It is almost exactly the same size as the United Provinces, but includes a large area of forested plateau land, and so has fewer inhabitants. Patna on the Ganges is the provincial capital. The province falls very easily into three natural regions which also correspond approximately to administrative divisions. These regions are (1) The Middle Ganges Valley, corresponding roughly with Bihar; (2) The Chota Nagpur Plateau, corresponding with Chota Nagpur; (3) The Orissa Coastal Strip embracing the division of Orissa.

**The Middle Ganges Valley.**—This part of the Middle Ganges Valley is a little damper than the part lying in the United Provinces. Of the whole region no less than three-fourths is cultivated, there is only 13 per cent. of

waste land, and again no forests. Rice, grown usually without irrigation, occupies nearly half the area devoted to food crops. Fig. 168 shows clearly the difference

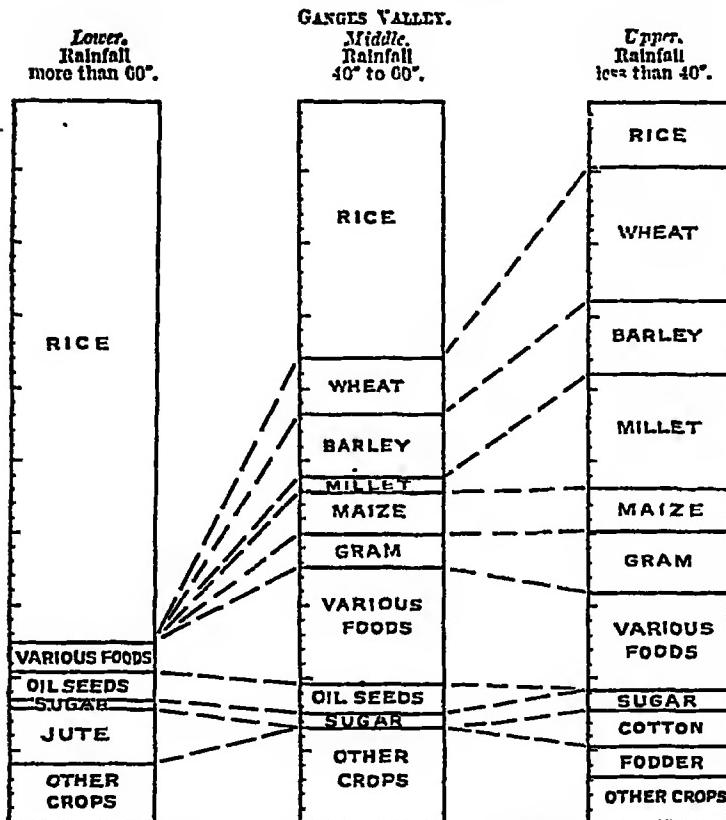


FIG. 168.—The crops of the Ganges Valley.

between the crops of this region and those of the Upper Ganges Valley. The inhabitants are the Biharis, who do not live in villages, but in small houses in the midst of their fields. The pressure on the land is so great that every year large numbers of Biharis go to work in the tea plantations of Assam, or on the docks of Calcutta.

*Patna* is the seat of provincial government and a large collecting station. It has given its name to Patna rice, a very fine kind of rice. It is on the south of the Ganges, and so connected directly with Calcutta by railway. Patna lies also just below the junction of three important tributaries of the Ganges—the Son, Gandak, and Gogra. *Monghyr* is a famous old town also on the southern bank of the Ganges; *Bhagalpur* is another town on the Ganges, farther east. Then there are several important towns which serve as collecting and distributing centres for the rich plains north of the Ganges. Examples are *Darbhanga*, *Muzaffarpur*, and *Purnea*. In the north the Province of



FIG. 169.—The proportion of cultivated land in the Ganges Valley  
(not including the Delta).

Bihar and Orissa borders Nepal and includes a small strip of the Terai country, described under Nepal.

The Chota Nagpur Plateau forms the north-eastern corner of the great plateau of Peninsular India. The plateau is in general from 2000 to 2500 feet high, but in the south is deeply cut into by the river Mahanadi and its tributaries. Everywhere the rainfall is good, and the plateau is forested. There are splendid forests of the valuable sal trees. On the flatter parts of the plateau are broad grassy areas. The plateau is largely occupied by native states. It is thinly populated and includes some of the wildest parts of India. In the depths of the forests are primitive tribes, such as the Santals, who still use bows and arrows and wear

no clothes. An important industry is the collection of lac from the trees. Rice is the most important food crop. The plateau consists mainly of old hard rocks : in the north there are mica-mines, in Singhbhum iron and copper ores are obtained. On the borders of the plateau are tracts of coal-bearing sedimentary rocks, and it is on the borders of Bihar and Orissa and Bengal that the most important coalfields of India are found. The coalfields of Jharia, Raniganj, and Giridih produce about 17,000,000 tons a year, or nine-tenths of all the coal of India. There is a smaller field at Daltonganj in the north. The important towns are the coalfield towns, including the railway centre of Asansol. On the plateau is Ranchi, the hot-weather capital of the Province.

Orissa forms part of the coast region of the northern part of the east coast—the Northern Circars Region. Along the coast itself are useless sand-dunes or mangrove swamps, behind which are fertile paddy lands. Further inland are low hills, tree covered, and fertile valleys. Two-thirds of this fertile and thickly populated region are cultivated, and rice occupies more than four-fifths of the cultivated land. The chief towns are *Puri*, a famous place of pilgrimage, and a seaside resort; *Cuttack*, an old capital of the kings of Orissa ; and *Balasore*, once an important port with English, French, and Dutch factories, but now little used.

#### 10. BENGAL.

The boundaries of the Presidency of Bengal have been frequently changed. Its present boundaries were determined in 1912. The Province consists almost entirely of a vast alluvial plain, crowded with people. There are so many people that it is one of the most thickly populated regions in the world, with nearly 600 people to the square mile.

Nearly the whole of Bengal belongs to one natural region—the Lower Ganges Valley or Deltas Region—consisting of the deltas of those mighty rivers, the Ganges

and Brahmaputra. In the north a small strip of Terai country (known in Bengal as the Duars) belongs to the Sub-Himalayan Region, whilst the district of Darjeeling lies in the Himalayan Region. In the east the Lushai Hills and the small state of Hill Tippera belong to the Eastern Hills Region ; in the west the region near the coalfields may be considered as belonging to the slopes of the Chota Nagpur Plateau. But by far the greater part of Bengal belongs to the Deltas Region.

**Deltas Region.**—For thousands of square miles there is not a hill or even a rock ; the soil is everywhere a fine silt (alluvium) and not a stone is to be found. The region is practically flat ; the rise from the sea towards the north is so gradual that it cannot be seen. Owing to the heavy rainfall—nearly everywhere over 60 inches—the country is always green and does not get dried up and brown like the Upper Ganges Valley.

The region may be divided into three parts :

(a) *The Ganges-Brahmaputra Doab, or North Bengal*, sloping gradually from the Sub-Himalayan Region in the north towards the Ganges. There are numerous silted-up river channels, and even now the rivers frequently change their courses. The usual flat surface is broken by a stretch of low hills called the Barind, covered by the remains of a former forest.

(b) *The Old Delta, or Central and Western Bengal*.—The great delta of the Ganges and Brahmaputra has moved gradually to the east, and Central Bengal is now a land of dead and dying rivers. The place of river channels which used to carry water from the Ganges to the sea is now often taken by large swamps or “bils.” Many of the bils have been drained and form valuable rice-land. Near the sea are the Sundarbans—great swamp forests. In Western Bengal west of the Hooghly River the level of the land gradually rises and the soil becomes poorer and harder, and the plain passes into undulating ground on the borders of the Chota Nagpur Plateau.

(c) *The New Delta, or Eastern Bengal*.—Here the great

rivers are still actively building up their deltas, and every year huge quantities of silt are brought down by the Ganges and the Brahmaputra. In the high-water season a great part of the area is flooded, and a rich deposit of silt is spread over the country. In this region, the true delta, there are few or no roads; bullock-carts are useless, and nearly all travelling is done by boats. Closely connected with this region is the Surma Valley, which lies in the Province of Assam. The houses in the delta are built on mounds to prevent them from being flooded in the rains. Although so wet, this is a densely populated country and produces enormous quantities of rice and jute. In the north is a slight ridge, the Madhupur jungle. Although insignificant, this ridge has been sufficient to prevent the great rivers moving still further eastwards.

If we look at the uses to which the land is put we find 6 per cent. is covered with forests. These are the Sundarbans, and they furnish firewood for the numerous towns. Nearly a quarter of the region is covered by bils, swamps, rivers, etc., and cannot be used. There is about 11 per cent. of waste land, mainly in the Barind, Madhupur Jungle, and Western Bengal. That leaves nearly two-thirds of the land, which is cultivated. Look again at Fig. 168, and notice that by far the most important crop is rice, covering three-quarters of the cultivated land. Jute is another important crop. The dry-zone crops—wheat, barley, millet, maize, etc.—have all entirely disappeared.

Nearly all the people in this region speak Bengali. Three-quarters of them are cultivators and live, not in villages, but in small houses or huts on mounds in the midst of their fields. They have not the same fear of fierce invaders as the people of the Punjab Plains, who in times past were forced to live together in villages for protection.

All the largest towns are industrial towns which have sprung up within recent years around rice or jute mills.

*Calcutta* is the largest city in India, and the second

largest (after London) in the British Empire. It was the capital of India until 1912, and still remains the "Commercial Capital" of India. A hundred years ago the site of Calcutta was an unhealthy swamp: it has grown to greatness by the labour of man and under the activities of the Government of India. Although 70 miles from the sea on the River Hooghly, it can be reached by large ocean steamers, and it is well situated to receive the products of a vast hinterland—the whole of the Ganges Valley. On the opposite side of the River Hooghly is Howrah, which really forms part of Calcutta, and which is connected by rail with nearly all parts of India.

*Dacca* is the second city of the region, and is the centre of the rich lands of the New Delta. Unlike Calcutta, it was an important city 300 years ago.

Outside Calcutta and Dacca there are really no large cities or towns. The jute-mill and rice-mill towns (such as *Bhatpara*, *Titagarh*, and *Serampore*) are mainly on the River Hooghly.

*Jhalakati* is a trade centre of Eastern Bengal, and the centre of the betel-nut trade. *Narayanganj* (a river port) and *Madaripur* are other collecting centres. *Goalundo* is another river port.

*Sylhet* is the centre of the Surma Valley of Assam. Notice the succession of canals—the Calcutta and Eastern Canals—by which rice and jute can be sent by water direct from Eastern Bengal to the mills on the Hooghly.

#### 11. BOMBAY

Next to Burma the Presidency of Bombay is the largest Province of India. Many parts of it are, however, thinly peopled. The Presidency is very irregular in shape. It includes the great region known as Sind, which is really the lower part of the Indus Valley and part of the Plain of Hindustan. The Peninsula of Kathiawar is made up of a large number of small native states, whilst the important native state of Baroda is composed of several

isolated tracts of country north of Bombay. The Presidency runs a considerable distance down the west coast of India, and also includes a large section of the plateau of Peninsular India. It is thus obvious that the large and irregular-shaped Presidency of Bombay will fall into a number of natural regions. We can distinguish :

- (a) Sind or the Lower Indus Valley, a very dry plain.
- (b) Gujarat, including Kathiawar and Baroda, an irregular and variable natural region.
- (c) The West Coast Region, a very wet region which lies between the Western Ghats and the sea.
- (d) The Deccan Lavas or Black Cotton Soil Region, forming part of the plateau.

Sind consists of a broad, dry alluvial plain stretching from the edge of the Baluchistan Plateau on the west to the Thar Desert on the east. Running from north to south through the centre is its life and soul—the Indus River. Just as Egypt is the gift of the Nile, so Sind is the gift of the Indus. When it leaves the Punjab Plain the river flows through a narrow rocky gorge which separates the Punjab Plain from Sind. The mighty river can here be crossed by a railway bridge (at Rohri).

Sind is a very dry region ; part of it gets less than 5 inches of rain per year. It would be a desert if it were not for the River Indus. In the past irrigation in Sind has been by "inundation canals," which are only filled with water when the river is in flood, and which dry up in the hot weather. But now a great dam has been built at Sukkur, in the north of Sind, and the country is now being irrigated by perennial canals. The Sukkur or Lloyd Barrage Scheme is one of the largest works for irrigation ever attempted. Away from the irrigated land Sind is a lonely barren desert. There are deep dry valleys once occupied by branches of the Indus. Probably the Indus once emptied itself in the Rann of Cutch, which is now a great marsh, almost dry in the hot weather. The delta of the Indus is not irrigated. Much of it is waste, though part is covered with pasture land.

Practically no "dry" crops are grown in Sind. On

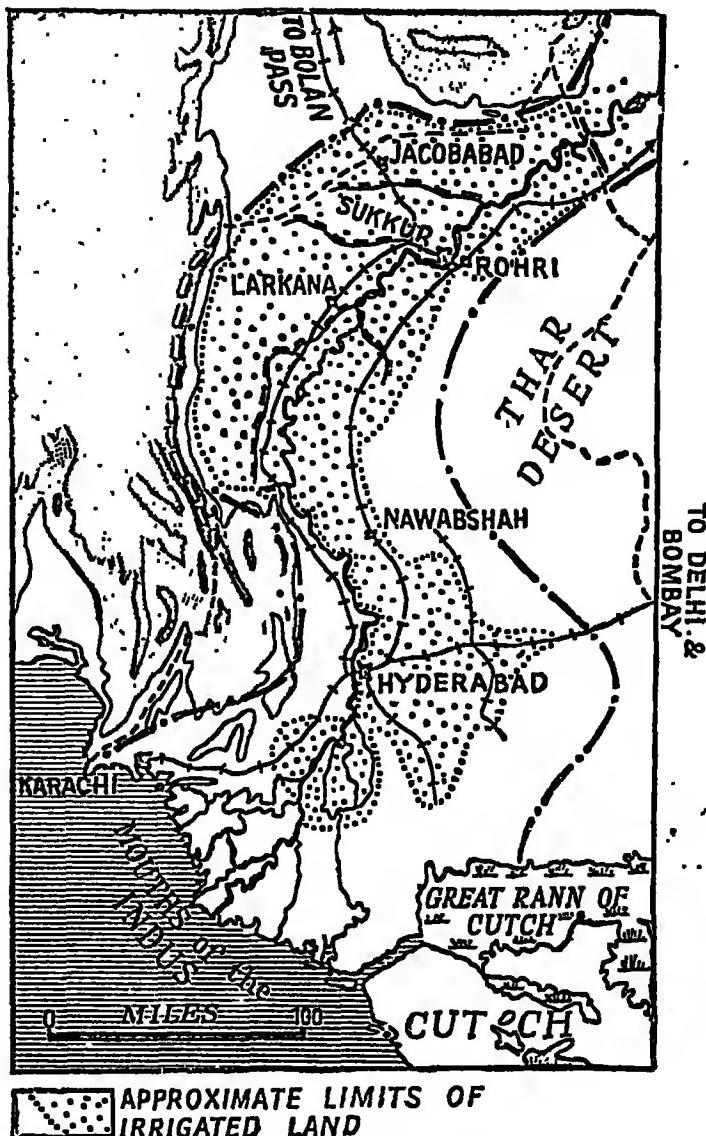


FIG. 170.—The Lower Indus Valley or Sind.  
Land above 1000 feet, dotted; above 3000 feet, black.

the irrigated land wheat, millet, and cotton are the leading crops.

The largest town in Sind is *Karachi*, the third port of India. Although not a very good harbour (it is protected by a breakwater), it is the natural outlet of the Punjab and rapidly growing. Notice the railways from Karachi. It is the great wheat port of India, exporting the wheat of the Punjab and also large quantities of cotton. It is growing in importance as an air-port. Regular aeroplane



FIG. 171.—The position of Karachi.  
Land over 1000 feet, black.

services now fly to London and to the other great ports of India. Another important town is *Hyderabad*, near the head of the delta.

Gujarat on the whole is a lowland region, but it has numerous small hills. At the northern end it adjoins the Thar Desert and the very dry region of Sind; at the southern end it adjoins the very wet region of the west coast. So we find the climate of Gujarat varies greatly from one part to another.

SOUTH GUJARAT is the wettest part. Along the coast the soil is salt and almost useless ; farther inland are rich black soils where rice, good cotton, and sugar flourish, and where many people live. Farther east are poorer soils, and then dense unhealthy forests inhabited by a few primitive tribes.

CENTRAL GUJARAT is drier ; rice can be grown on the

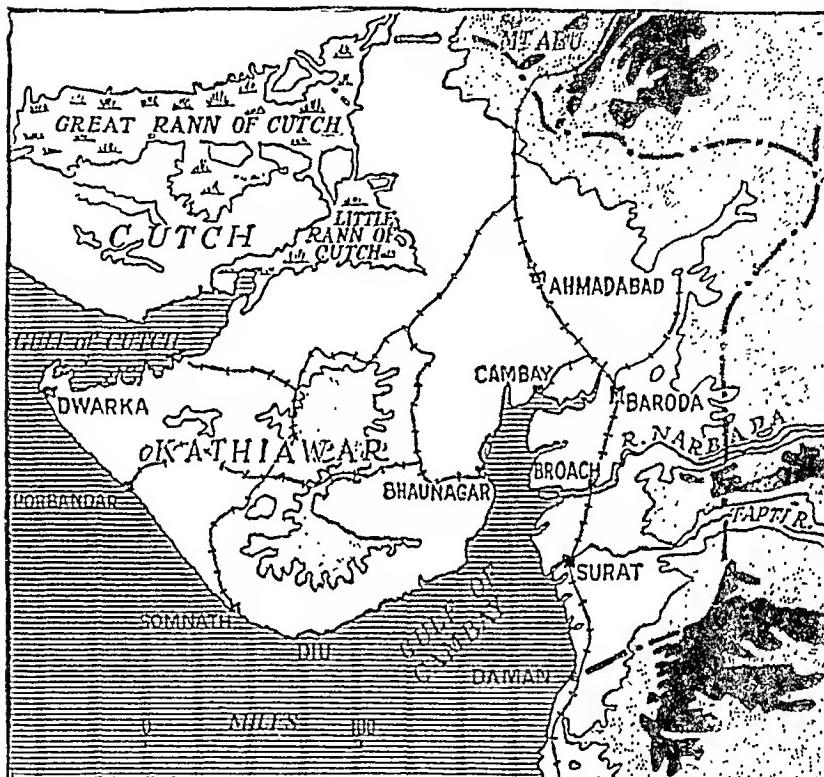


FIG. 172.—Gujarat.

Land over 500 feet, dotted ; land over 2000 feet, black.

alluvium near the rivers, but millet and cotton are most important. The eastern parts are hilly and partly covered by scrub, but are healthier than in South Gujarat.

NORTHERN GUJARAT is still drier, and is usually a flat region with poor sandy soil. Wherever the soil is richer the people have gathered together, and millet is grown.

KATHIAWAR is a large peninsula suffering from a very variable rainfall. In the centre are forest-covered hills with valuable timber, but much of the country is a barren land of very little value. The people and their villages are concentrated in a few of the more fertile valleys. Porbander stone, much used for building in Bombay, is quarried.

CUTCH is a barren, rocky, treeless, and useless country, still drier than Kathiawar.

Most of the important towns of Gujarat lie on the railways.

*Baroda*, the capital of the important state of Baroda, is a large railway junction, and has modern cotton mills.

*Surat*, near the mouth of the Tapti, was once the leading port of the west coast, but its place has been taken by Bombay.

*Cambay* and other towns round the Gulf of Cambay are less important than formerly. Their local industries have largely been replaced by the great cotton mills of Bombay.

*Ahmadabad* is the great collecting centre of Northern Gujarat, and is also a mill town.

The towns of Kathiawar are mostly capitals of states, but also act as collecting centres for the more fertile portions of the peninsula.

The West Coast Region runs right down the western coast of India. The northern part lies in the Bombay Presidency, the southern part in Madras. Halfway down the coast is the Portuguese territory of Goa. The western coast of India is very straight, and so there are few bays which can be used as harbours. There is only one important island, and that is the island on which Bombay stands. The region consists of a narrow plain, fertile and thickly populated, but backed by high mountains. Considering the northern part of the region, it is only from Bombay that the mountain escarpment of the Western Ghats can be easily crossed. We see that the West Coast Region really falls into three parallel strips. Near the sea are lines of sandbanks on which coconuts grow. At

intervals are mangrove swamps. Behind the sandbanks are the flat alluvial lands. Everywhere the rainfall is more than 80 inches, and rice occupies half the cultivated land. Further inland are the hill-slopes covered with dense evergreen forests. Forests cover a quarter of the whole region. The many short rivers are of little use for boats, but many of them can be used for floating logs of timber from the forests. In years to come they may be used for generating electricity.

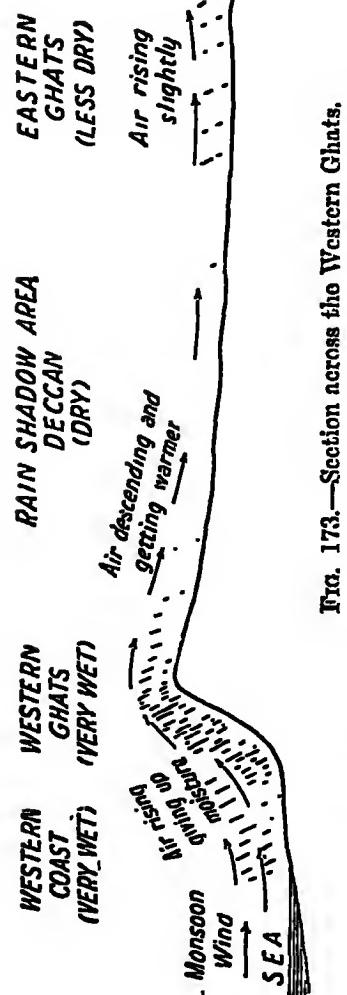


FIG. 173.—Section across the Western Ghats.

*Bombay* is the only really large town and has a fine large natural harbour. Being built on an island there is great congestion in the town, for it has little room to expand. Notice the gaps in the hills through which the railways from Bombay pass inland to its fertile hinterland. It is from the plateau region behind that Bombay gets most of the raw cotton for its numerous cotton mills.

#### The Deccan Lavas Region.

—The north-western part of the great plateau of Peninsular India has been covered by great sheets of a lava which weathers into a dark soil, particularly suited to cotton. The great sheets of lava have only been cut through by some of the deeper river valleys, such as

that of the River Tapti. Except the Dharwar district in the south, the whole of Bombay east of the Ghats lies in this natural region. The region also includes Berar and the western half of Hyderabad. Nearly the whole of the region is over 1000 feet above sea-level, and there are large areas over 2000 feet. The Deccan Lavas Region lies in the rain-shadow of the Ghats, and except along a narrow strip near the Ghats the rainfall is less than 40 inches. Forests cover a considerable area, and are found especially on the slopes of the Western Ghats. There grow teak and other valuable trees. Two-thirds of the area is cultivated, but the crops are nearly all dry crops since there is little flat land available for irrigation, nor are there any large permanent streams whose water could be used. The use of wheat is spreading, but the staple food grain is still millet, and millet covers nearly half the cultivated land. This is the greatest cotton-growing region of India, and nearly a quarter of the cultivated land is devoted to cotton. The short-stapled Indian cotton is grown principally. The raw cotton is sent to Bombay, either to be exported raw or used in the mills there.

RICE WHEAT GR.%	M I L L E T 47 %	OTHER FOODS	COTTON 21 %	OTHER CROPS

FIG. 174.—Crops of the Deccan Lavas region.

This drier region does not support so many people as the wetter rice-growing lands, and there are only about 150 people to the square mile. Most of the people speak Marathi.

*Poona* lies near the crest of the Western Ghats, and commands one of the gaps or gateways leading to Bombay. It is the hot-weather capital of the Bombay Presidency.

*Sholapur* is a big centre farther south:

## 12. MADRAS

Among the Provinces of India, the Presidency of Madras comes next in size after Burma and Bombay, but it is much more thickly populated than either. The Presidency has grown up round the famous old centre of the East India Company, Fort St. George, which is now known as Madras. The presidency includes the whole of the southern part of the Peninsula, and stretches along the west coast northwards between Mysore and the sea. It stretches right along the east coast as far as the boundary with Bihar and Orissa, and in addition to the coastal regions includes a portion of the Deccan Plateau and the Eastern Ghats. The Presidency of Madras thus lies in the following natural regions :

- (a) West Coast Region, very wet.
- (b) Carnatic Region, or Tamil Plains, forming the southern part of the east coast.
- (c) The Northern Circars Region, or northern part of the east coast.
- (d) The Deccan Plateau.

The West Coast Region has already been described in part under Bombay. The southern part is similar, but the alluvial plains between the hills and the sea are broader. The whole region is very wet, and can be divided, still more distinctly, into three strips :

- (a) The sand dunes along the coast, largely covered by coconuts.
- (b) The flat alluvial land behind the sand dunes. The water of small streams from the hills is prevented from reaching the sea by the line of sand dunes, and so spreads out to form shallow lagoons. The lagoons have been connected by canals, and it is possible to travel for hundreds of miles along the west coast through these canals. Many of the lagoons are open to the sea, and some are deep enough to form harbours for native craft. One, the harbour of Cochin, is being dredged near its mouth, and may soon

form a very important harbour on the west coast. The banks of the lagoons are often lined with coconut planta-

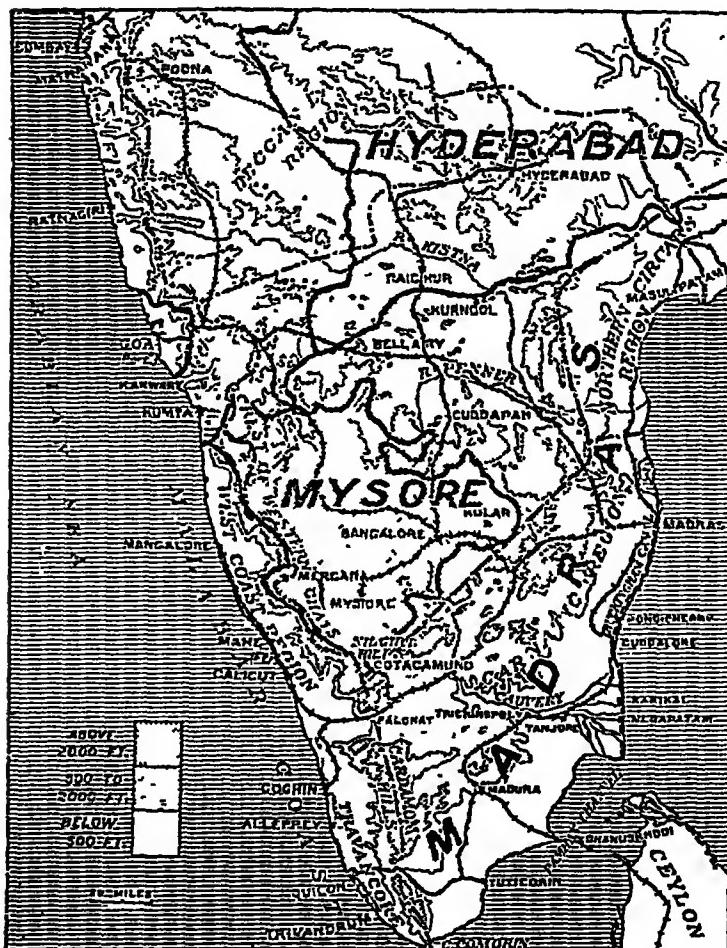


FIG. 175.—Map of Southern India (Bombay, Madras, Hyderabad and Mysore).

tions, whilst every suitable piece of land is planted with paddy. Here and there are groves of the areca or betel-nut

palm, and the pepper plant, for which this coast has so long been famous, is still grown.

(c) The slopes of the Western Ghats are covered with dense evergreen forests, and forests cover nearly a quarter of the whole region.

This region is densely populated. The staple food is, of course, rice, but many of the rice cultivators are backward, jungle tribes. The coconut palm is of great importance to the inhabitants. Their huts are thatched with its leaves; the wood is used for building and for firewood. The preparation of the fibre of the husks, or "coir-picking," is an important industry and the dried kernal (copra) is

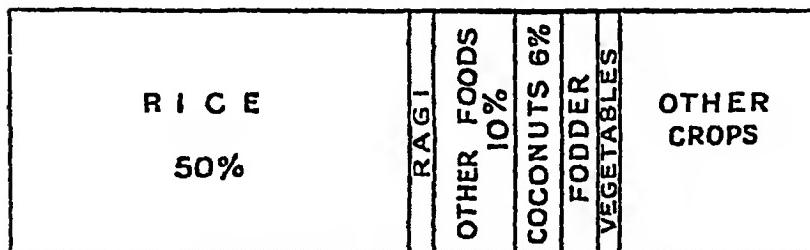


FIG. 176.—Crops of the west coast region.

exported. Coconut oil is also obtained, and the juice of the coconut is made into a strong drink.

Rubber planting is becoming a noteworthy industry in Travancore. Fishing is a common occupation along the coast.

*Mangalore* is a small town connected by rail with Madras.

*Calicut* is the fourth largest town in Madras Presidency, and has a small timber trade. Like Cochin, it was once a famous spice port.

*Cochin* is likely to increase greatly in size and importance when its harbour is deepened.

*Alleppey* and *Quilon* in Travancore are growing industrial centres where coir rope and mats are made.

*Trivandrum* is the chief town of Travancore, and can now be reached by railway from Madras.

The Carnatic Region stretches from the coast of the Bay of Bengal to the crest of the Cardamom Hills, which separate it from the West Coast Region, and, further north, to the edge of the Deccan Plateau. The Carnatic Region falls into two parts: the lowlands near the coast or Coastal Plain, and the hilly western part. The Coastal Plain consists mainly of alluvium, but the hills are of old hard rocks. The climate of this region is different from that of all other parts of India. The rainiest months are October, November, and December. The rain is brought mainly when the North-East Monsoon has commenced to blow. When the South-West Monsoon is blowing this region lies in the rain-shadow of the Cardamom Hills and the Deccan Plateau. In June, when the west coast is cooled by rain or the sun is hidden by clouds, the neighbourhood of Madras is hot and the sky is clear.

Nearly two-thirds of the coastal plain is cultivated, but rather less than a half of the hilly parts. Forests cover a quarter of the hilly parts. This part of India used to suffer greatly from famine, for the rainfall is only about 40 inches—much less in the western parts—and varies greatly from year to year. The people have made many large “tanks” or lakes in which the rain-water can be stored, and the water used when the crops badly need it. But in bad rainfall years the tanks may never be filled. Government has now completed a number of large irrigation works in this region, but the irrigated land is not nearly so extensive as in the dry parts of the Hindustan Plain.

(a) *The Periyar Project.*—The Periyar River flows down the very wet western side of the Cardamom Hills. The water has now been brought through a tunnel to the dry eastern side of the hills, and used to water the flat land round Madura.

(b) West of Madras a large tract of country is watered from the Poini, Palar, and Cheyyar rivers.

(c) A great system of canals covers the Cauvery Delta. This is one of the oldest of the large irrigation works in India.

We must notice the effects of irrigation on the crops. In the coast lands rice is more important than millet, in the hills millet is more important than rice. Both are used by the people as staple foods. Everywhere a considerable area is devoted to ground-nuts and cotton. The ground-nuts are grown for their oil. Down the sandy dunes of the coast many coconuts are grown. On the slopes of the Nilgiri Hills there are tea gardens. The most important trees of the forests are teak and sandalwood. Mica is mined in Nellore. Along the coast salt is obtained from the sea, and there are many fishermen. The people of this natural region all speak Tamil.

Along the coast there are no inlets to serve as harbours. At the small ports steamers have to anchor a mile or more from the shore, and land their goods and passengers by small boats.

*Madras* has the only good harbour along the coast—it is entirely artificial. Madras is the third largest city and the fifth most important port in India. As a port its trade is a long way behind Karachi and Rangoon. There are cotton mills in Madras, and both cotton goods and raw cotton are exported. The tanning of hides and export of leather also belong to Madras.

*Pondicherry* is the capital of the French possessions in India, which comprise a few small isolated towns.

*Cuddalore* and *Tuticorin* (famous for pearl fisheries) are two ports.

*Dhanuskhodi* is only 22 miles from the nearest point of Ceylon. It is not really a town, but merely the terminus of the South Indian Railway ; the mails to Ceylon go by this route.

*Madura*, *Trichinopoly*, and *Tanjore* are inland centres.

Notice the railways from Madras, and the way in which they make use of natural gaps to reach the west coast. Near the coast, running north and south from Madras, is the Buckingham Canal.

**The Northern Circars Region.**—The northern end of this region has already been described under Orissa.

Although a coastal region, it is scarcely a coastal plain, for there are many small hills, some of which come right to the sea. The region lies between the crest of the Eastern Ghats and the Bay of Bengal. The central part is made up of the big deltas of the Godavari and Kistna

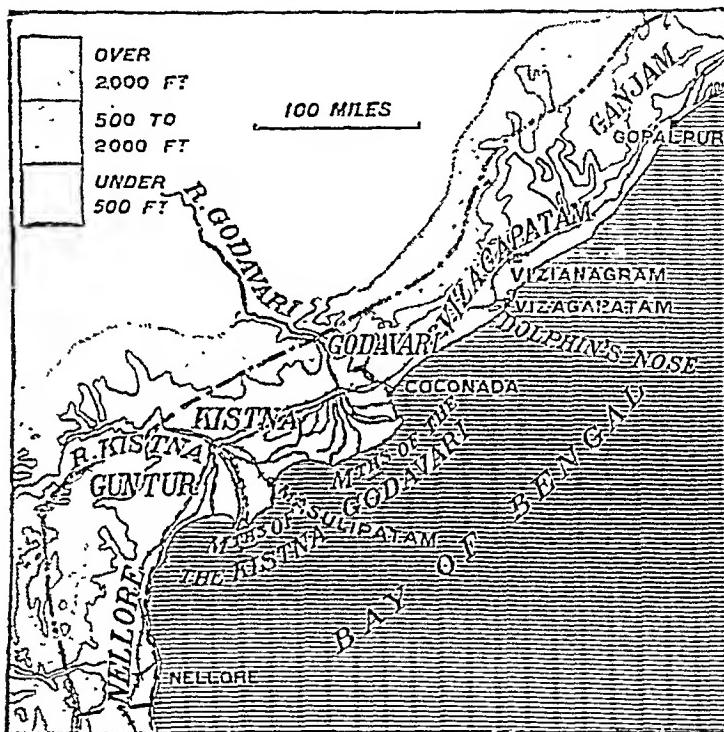


FIG. 177.—The Northern Circars region.

rivers. These deltas are irrigated. The flat areas are of alluvium, but the hills are of crystalline rocks. Manganese ore is obtained near Vizagapatam. In the north the rainfall is a little over 40 inches, but the climate gets drier southwards. Unlike the Carnatic Region, the rain falls during the South-West Monsoon. More than half the land is cultivated; on the damper hills there are forests. Taking

the region as a whole, rice is the chief crop, followed by millet. It is interesting to notice the effect of rainfall on crops. The dry district of Guntur, with 31 inches of rain, has only 3 per cent. of rice. Northwards there is a gradual increase in rainfall and rice ; wet Ganjam, with 45 inches of rain, has 54 per cent. of rice.

There are no good harbours down the coast, but great progress is being made with a big harbour scheme for Vizagapatam. This town is partly sheltered behind a headland

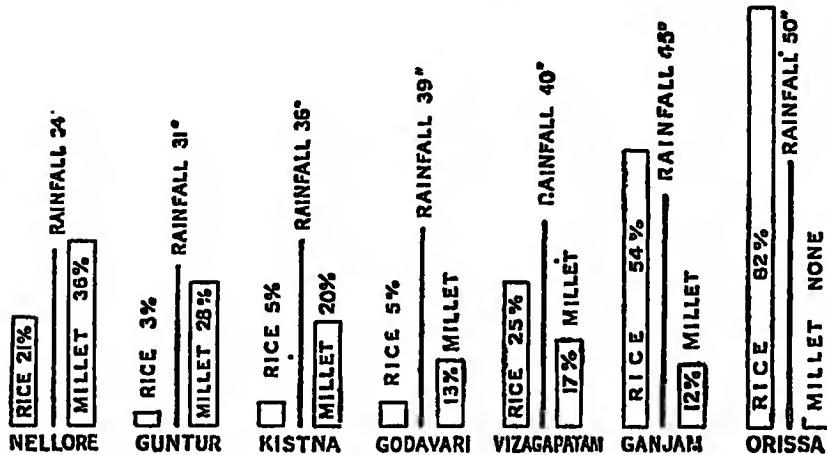


FIG. 178.—Crops and rainfall on the east coast.

called the Dolphin's Nose. A railway is being built from Vizagapatam inland to the heart of Central India.

*Coconada* is at present the largest port, and has a small but rich hinterland. *Masulipatam*, *Calingapatam*, and *Gopalpur* are other small ports.

*Vizianagram* is the largest inland town.

**The Deccan Plateau.**—The “Deccan districts” of Madras—Bellary, Kurnool, Anantapur, Cuddapah, and part of Chittoor—lie on the Deccan Plateau, but we will describe the main plateau under Mysore before dealing with this area.

The Eastern Ghats are partly occupied by the Agency Division of Madras—to be described later.

## 13. MYSORE

This important native state is ruled by a Maharaja who has direct relations with the Government of India. The British officer attached to the court is called the British Resident. Mysore lies entirely on the high southern part of the Deccan Plateau. Besides embracing Mysore, the Deccan Plateau stretches away northwards to embrace the Deccan districts of Madras, the eastern half of Hyderabad, and the Dharwar District of Bombay.

The Deccan Plateau.—In some books the whole of the plateau of Peninsular India is called the Deccan; but, strictly speaking, only the southern part should be called the Deccan. In the south the plateau is higher, and has not been so cut into by river valleys as it has been farther north. The crests of the Western Ghats usually exceed 3000 feet, and the whole of Mysore is over 2000 feet. But farther north the Kistna and its tributaries have cut deeply into the plateau, and the portions of the plateau lying in Madras and Hyderabad are between 1000 and 2000 feet high. The Deccan Plateau lies in the rain-shadow of the Western Ghats, and is dry. A strip along the western side, which is really the slopes of the Ghats, is damper, but some of the plateau receives less than 20 inches a year. Unfortunately, too, the rainfall is irregular, and in some years the numerous tanks are not even filled with water. Although cool by reason of its height, the plateau is away from the influence of the sea, and the range of temperature is great. The plateau consists entirely of old crystalline rocks. Gold is mined in the Kolar Gold-field of Mysore. Manganese ore is also obtained in Mysore. Although the old rocks yield a poor soil, more than half the plateau is cultivated, and some of the flatter parts are irrigated. Forests cover a considerable area on the damper western parts and on the wetter slopes of other hills. Millet is the leading grain, but rice can be grown on the flat surface of the plateau in Mysore, or on the irrigated valley land in Madras. Cotton occupies one-tenth of the

cultivated area. Coffee planting used to be an important industry in Mysore, but a disease destroyed many of the bushes, and coffee can be grown more cheaply in Brazil and other parts of the world. Sheep flourish on the dry grass on the hillsides, and the Deccan Plateau has a quarter of all the sheep of India. The people in Mysore speak Kanarese (or Kannada, as it is sometimes called). In the northern part of the plateau Telugu is spoken. Mysore has 200 people to the square mile ; farther north there are less.

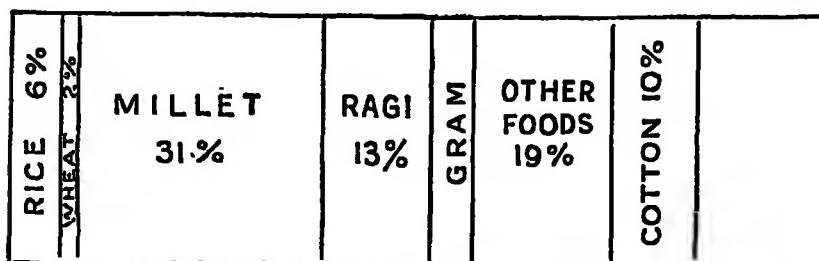


FIG. 179.—Crops of the Deccan.

*Mysore* is the capital of the state, but *Bangalore* is the largest town and seat of government. There are silk factories at Mysore and Bangalore.

*Kolar* is the centre of the goldfields.

The southern point of the plateau is formed by the Nilgiri Hills (mentioned under Madras). Outside the borders of Mysore is Ootacamund, the hill station of Madras Presidency.

In the Deccan districts of Madras is *Bellary*, the largest town, and *Kurnool*, which lies at the head of the Kurnool-Cuddapah Canal. This canal formed a small part of an enormous scheme to irrigate most of the drier part of Madras, but it was a failure.

#### 14. COORG

The tiny British Province of Coorg, with its principal town, Mercara, lies to the south-west of Mysore, on the slopes of the Western Ghats. Much of it is forested.

### 15. HYDERABAD

Hyderabad is the largest native state in India, and is ruled by the Nizam. The capital of the state, Hyderabad, is the fourth largest city in India. The state lies entirely on the plateau of Peninsular India, and falls into two



FIG. 180.—The Godavari Valley and the North-Eastern Plateau.

Land over 3300 feet, light dots; 500 to 3000 feet, dark dots; over 3000 feet, black.

halves. The western half, or Marathwara, where Marathi is spoken, is covered by the Deccan Lavas, and forms part of the Deccan Lavas Region, already described under Bombay. It is not so highly developed as the neighbouring parts of Bombay and Berar, but grows very large quantities

of cotton, and, as in Berar, the staple food of the people is millet. Gulbarga and Aurangabad are two of the most important towns.

The eastern half, or Telingana, where Telugu is spoken, is part of the Deccan Plateau, described under Mysore. The old crystalline rocks yield a less fertile soil, and very much less cotton is grown than in the western half. There are about 150 people to the square mile. Hyderabad is the natural centre of the state, and is now well served by railways.

The north-eastern part of Hyderabad slopes down towards the Godavari River, and cannot really be considered as part of the Deccan Plateau. The Godavari Valley almost forms a natural region of its own, which lies mainly in the Central Provinces.

#### 16. THE CENTRAL PROVINCES—including BERAR

The Central Provinces and Berar occupy a large area in the heart of India. The Central Provinces are larger than the United Provinces, but have only one-third as many people. They are nearly as large as Madras, but have less than half as many people. On the whole, the Central Provinces are not so well developed as most of the British Provinces in India, largely because the country is not so suited for development.

The country is very varied. Running through the north of the Central Provinces is the great line of highlands which divides Peninsular India from Northern India—the Satpura Line. In the Central Provinces the highlands are known as the Mahadeo Hills and the Maikal Range, and pass eastwards into the Chota Nagpur Plateau. North of this line the country belongs to the Central Indian Foreland. South of this line is Berar, forming part of the great cotton-growing region of the Deccan Lavas, described under Bombay. The flat land round Nagpur forms part of the Godavari Valley. Around Raipur is another plain, the

Chhattisgarh Plain, or Valley of the Mahanadi, whilst in the south are the wild hill regions of the Eastern Ghats.

Berar is the most developed region, on account of its rich cotton soil. Akola and Amravati are the collecting centres from which the cotton is sent by rail to Bombay.

The Valley of the Godavari and its tributaries includes the flat land south of Nagpur. Farther south the valley is narrow, and where the river cuts through the Eastern Ghats there are dangerous rapids. The river is navigable for at least part of the year, and short railways have been built round the rapids. Coal is known to occur in the Godavari Valley, but is not yet worked.

The Chhattisgarh Plain, or Valley of the Mahanadi, is a rice-growing region centring round the town of Raipur. The rainfall is only a little over 40 inches, so a good proportion of the land has been irrigated.

The Eastern Ghats form a wild hilly region, like the Chota Nagpur Plateau, inhabited largely by primitive forest tribes. The region includes the State of Bastar (C.P.) and the Agency Division of Madras. The hills are forest-covered, and there are many sal trees.

The Central Highlands and Plateau Regions also resemble the Chota Nagpur Plateau, but are somewhat drier and are more developed.

The Central Indian Foreland, or northern slopes of the Central Highlands, belongs mainly to the Central India Agency.

*Jubbulpore* is a large and important town, occupying a key position at the head of the Narbada Valley, just where the Central Highlands can be easily crossed.

## 17. RAJPUTANA AND AJMER-MERWARA

Rajputana is a large federation of native states in the north-west of India, south of the Hindustan Plains. In the centre lies the small British Province of Ajmer-Merwara. Running through the centre of Rajputana from south-west to north-east is the Aravalli Range. North-west of

this range the country is very dry, and slopes down gradually towards the Indus Valley and the Punjab Plain. This sloping area forms the Thar or Great Indian Desert. South-east of the Aravalli Range there is an upland country which may be called the Rajput Upland.

The Thar Desert is a vast area lying between the Aravalli Hills and the plain. It is a sandy waste, interrupted by bare rocky hills and waterless valleys. The ground is often entirely bare, but in some places there may be a few shrubs or plants with thick fleshy stems. The rainfall is generally less than 10 inches, and is very irregular, falling mainly during storms. Although the rainfall is greater than in the rich Indus Valley, the land remains a desert because there are no large rivers which can be used for irrigation. The desert is almost uninhabited. Villages may spring up where there is a little water, and some millet can be grown; but when the water supply fails, the village has to be abandoned. Many people own camels, and trade across the desert. *Jaisalmer* is a centre of the camel caravan routes. *Bikanir* is noted for its manufactures of camel-hair goods and cotton goods. Throughout history the desert has formed a great barrier to the movement of man.

The Rajput Upland Region as a whole is a dry region, receiving less than 40 inches of rain, but in the damper and more sheltered parts forests can grow. Most of the area consists of old crystalline rocks, but in the south there are great sheets of Deccan Lava. The southern half of the region lies in the western part of the Central India Agency.

This natural region is very varied, and includes :

- (a) The Aravalli Range.
  - (b) The forested hills of Southern Rajputana.
  - (c) The valleys of Eastern Rajputana.
  - (d) The Vindhya hills and their northern slopes, with Mahiwa Plateau.
  - (e) The Narbada Valley.
- The crops depend mainly on rainfall, which is irregular,

and in bad years both harvests may fail and severe famine result. Owing to the irregular rainfall, the region is thinly populated. The staple food is millet, and much grain is grown for fodder. In the forested hills live the Bhils, a wild forest tribe.

Agriculture is bad, and so more people earn their living by industry than in other parts of India. Woollen goods, especially blankets, are made from the wool of sheep and goats in many places. In the drier parts, bordering the Thar Desert, camel hair is used for carpets, etc.

*Ajmer* is a large town with railway workshops, food and textile industries. It is also situated on an important railway.

*Jaipur* is larger than Ajmer, but is getting smaller.

*Jodhpur* is another large town.

*Udaipur* is the beautiful capital of an important state of the same name.

The other towns in Rajputana owe their importance usually to their being capitals of states.

#### 18. THE CENTRAL INDIA AGENCY

The Central India Agency is a federation of native states lying in Central India. The most important is Gwalior. The states form two blocks of country, separated by a portion of the United Provinces. The western half lies in the Rajput Upland Region; the eastern half lies in the Central Indian Foreland.

In the western half *Indore* is the largest town and is an industrial centre. *Bhopal* has few industries, and is getting smaller. *Lashkar* and *Ujjain* have cotton factories. The town of Gwalior is on the borders of the Ganges Valley.

The Central Indian Foreland, including the regions known as Bundelkhand and Baghelkhand, forms the northern part of the Central Provinces, the eastern part the Central India Agency, and a strip of the United Provinces south of the River Jumna (including the district of Jhansi). The region slopes gradually from the Central Indian Highlands to the Ganges Plain. The rainfall is

about 40 inches ; millet and cotton are the most important crops. The eastern part is damper and is watered by the Son River.

The importance of the position of Jubbulpore (Central Provinces) has already been noted. Jhansi (United Provinces) also occupies a key position as a railway junction.

#### 19. BURMA

Burma is the largest of the Provinces of India, and in most respects it is quite different from the rest of the Indian Empire. It is shut off from India by a wall of mountains over which there is no railway nor proper road, so that Burma can only be reached from India by sea. The people who inhabit Burma are Mongolians, more closely allied to the Chinese than to the Indians. The southern part of Burma, known officially as Lower Burma, became part of British India between 1826 and 1852. The Burmese Kingdom of Upper Burma was annexed after the misrule of King Thibaw in 1886. The principal city of the Province is Rangoon, the fourth port of the Indian Empire, and has grown from a small village as a result of British rule. The only other large town in the province is the former Burmese capital of Mandalay. Included in the province are the numerous native states collected together as the Federated Shan States, as well as certain hilly tracts which are not administered at all.

**Physical Features.**—The important feature of the mountain ranges and the rivers is that they both run from north to south. It has already been explained that the mountains are arranged like the fingers of a man's hand. The River Irrawaddy is navigable by river steamers as far north as Bhamo, nearly 1000 miles from its mouth. Its big tributary, the Chindwin, is also navigable for several hundred miles. Some of the smaller tributaries can be used by small boats, but they are more important for floating logs of timber from the forests to the main river. The Salween is only navigable by steamers for



FIG. 181.—General map of Burma.

about 80 miles, when it passes through a gorge with rapids. The coasts of Burma are quite different from those of India. Both the Arakan and Tenasserim coasts are rocky and fringed with numerous islands.

**Geology.**—The Arakan Yomas and the Pegu Yomas are two fold ranges of young rocks. Between the two lies an area of young soft rocks, little folded, forming the valley of the Chindwin and the Lower Irrawaddy. It is here that the great oilfields of Burma are found, and Burma produces about 270,000,000 gallons of oil every year. The wild mountainous eastern half of the province—that is, the Shan Plateau and its southward continuation into Tenasserim—consists of old hard rocks. In the north rubies and other precious stones are found at Mogok, but the mines are not so important as they used to be. At Bawdwin is one of the largest deposits of silver and lead ore in the world. The ore is smelted near by at Namtu. There are big deposits of silver and lead ore near Heho, farther south. Tenasserim has rich deposits of tin, especially around Tavoy, and with the tin is found wolfram. Wolfram is used for mixing with iron to make certain kinds of steel. There are numerous deposits of poor quality coal in Burma, but they are not yet mined.

**Climate.**—The important feature about the climate is the “Dry Belt” of Central Burma, which lies in the rain-shadow of the Arakan Yomas and receives less than 40 inches of rain a year. All the coastal region receives a very heavy rainfall. Central Burma is very hot in the hot weather owing to the absence of clouds and the cooling influence of rain, as well as distance from the sea. In the cold weather Burma gets gradually cooler as one goes from south to north. The great Shan Plateau averages 3000 feet above sea-level, and so remains cool all the year.

**Vegetation.**—Burma is less thickly populated than most parts of India, and so natural vegetation still covers a very large part of the country. Where the rainfall is more than 80 inches, evergreen forests are found, but the

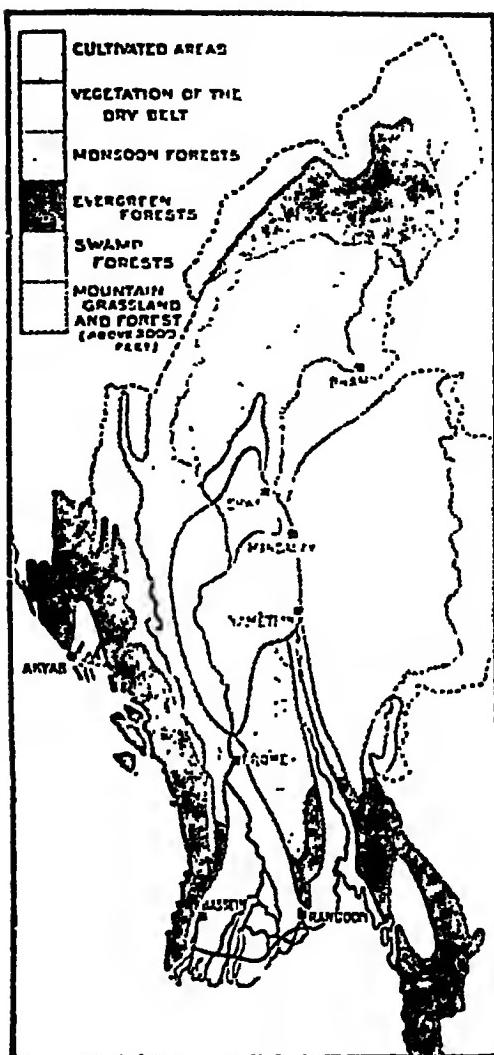


FIG. 182.—The natural vegetation of Burma.

valuable forests of Burma occur where the rainfall is between 40 and 80 inches. It is here that the monsoon

forests with teak, pyinkado, in, ingyin, and other valuable timber trees are found. Teak is very rarely found by itself. It is nearly always mixed with many other trees. The teak forests are found on the Pegu Yomas, the eastern slopes of the Arakan Yomas, and the hill ranges north of the Dry Belt. Some teak is also found on the Siamese border, and is floated down the River Salween to Moulmein. The drier parts of Burma are covered with scrubland, whilst the hills and plateaux above 3000 feet are clothed with evergreen oak forests together with some grassland.

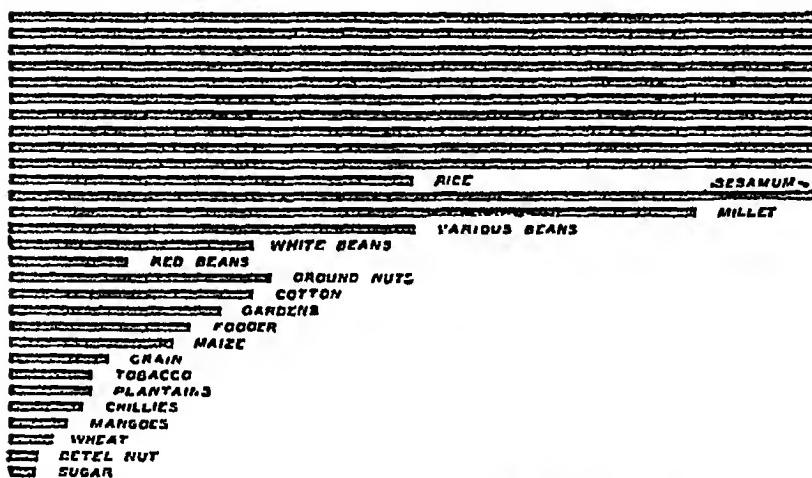


FIG. 183.—The principal crops of Burma.

The cultivated land is found mainly on the broad stretches of alluvium which border the rivers and build up their deltas. People of the hills merely grow enough for their own needs on small clearings in the jungle near their villages. The great food grain of Burma is rice, which occupies two-thirds of all the cultivated land in the province. In the Dry Belt sesamum, millet, beans, ground-nuts, and cotton are grown.

**Population.**—Although Burma is the largest Province of India, it has only 13,000,000 people. Over 11,000,000 of these are Burmans, and they live mainly on the fertile

alluvial lands by the rivers. We include with the Burmans the Arakanese of Arakan and the Talaings and Tavoyans of Tenasserim, for they are very similar. They are all Buddhists by religion; or followers of the Great Teacher Buddha. They have no caste system, and in most respects men and women have equal rights. The hilly regions and the plateaux are inhabited by more backward people, such as the Chins of the Arakan Yomas, the Karens of the Pegu Yomas, the Shans, Palaungs, and the Was of the Shan Plateau, and the Kachins of the north. They number about a million. Then there are nearly a million Indians of all sorts who have settled in Burma.

#### Natural Regions.—

Burma falls very simply and naturally into seven natural regions:

(1) The Arakan Coastal Strip, narrow, very wet and warm.

(2) The Tenasserim Coastal Strip, narrow, very wet and hot.

(3) The Western Hills Region, or the Arakan Yomas, which forms the mountain wall between Burma and India.

(4) The Shan Plateau, high, with a moderate rainfall, thinly populated.

(5) The Northern Hills Region, or tract of country

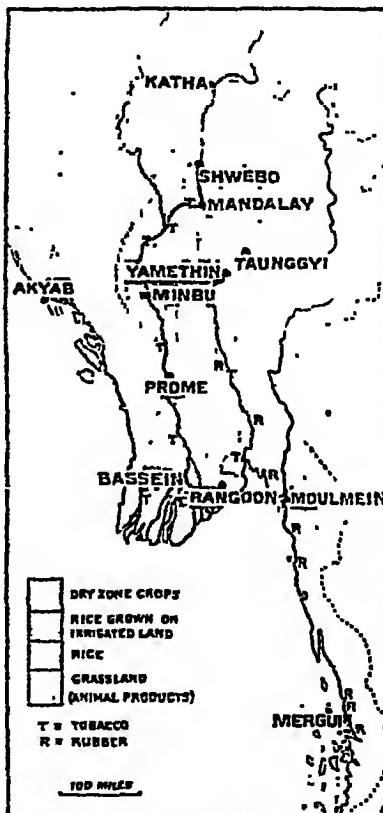


FIG. 184.—The crops of Burma.

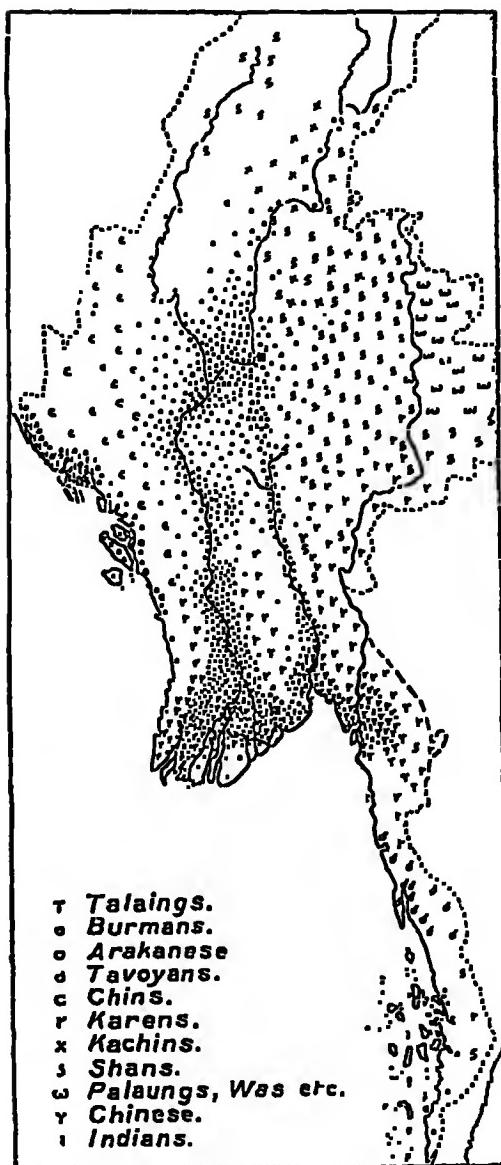


FIG. 185.—The population of Burma, showing the different races. Dot or symbol represents 10,000 people.

lying to the north of the Dry Belt, and in which the Irrawaddy and Chindwin have their upper courses.

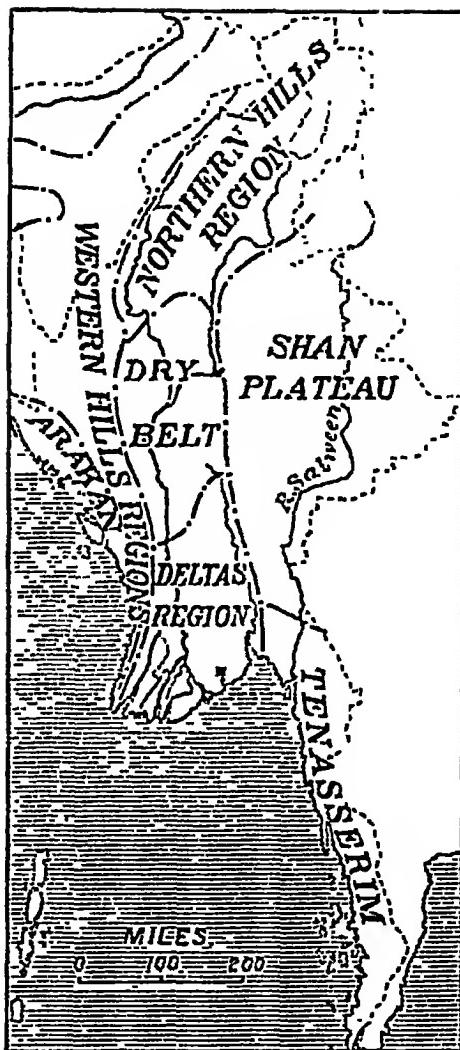


FIG. 186.—The natural regions of Burma.

- (6) The Dry Belt of Central Burma.
  - (7) The Deltas Regions of Lower Burma.
- The Arakan Coastal Strip forms a narrow tract of land

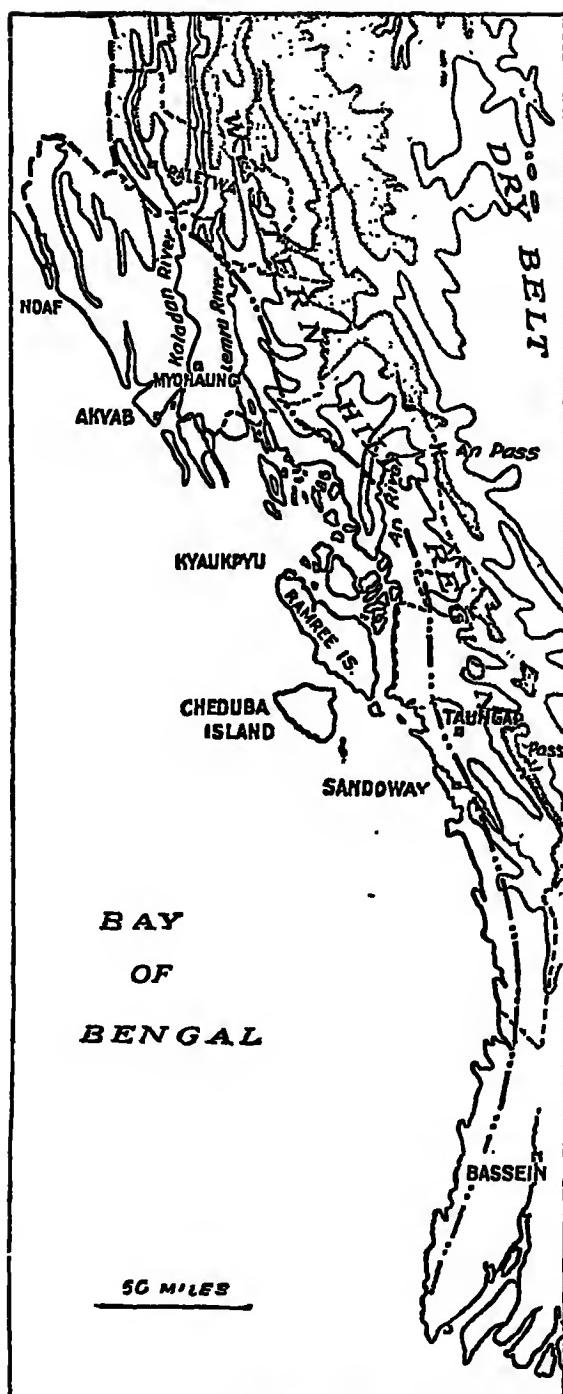


FIG. 187.—Arakan Coastal Strip.

between the mountain wall and the Bay of Bengal. It is broadest in the north and gets narrower towards the south. It is almost everywhere hilly : only in one place is there a

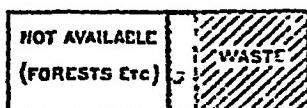


FIG. 188.—Proportion of cultivated land in Arakan. Cultivated land in black.



FIG. 189. The crops of Arakan.  
P, fruit; D, dham; C, chil-  
lie; T, tobacco; O, others.

stretch of flat land. This is in the north near the town of Akyab. The coast is rocky, and there are numerous inlets and islands. The rivers are for the most part short rushing torrents from the mountains. Only one-tenth of the land is cultivated, one-half is waste land, and the remainder is covered by evergreen forest or bamboo jungle. Some, but not all, of the waste land might with difficulty be cultivated. The region catches the full force of the South-West Monsoon, and all parts get a heavy rainfall—not less than 100 inches. By far the most important crop is rice. Most of the people live on the flat land which lies near the town of Akyab. Akyab has a good harbour, but is only a small

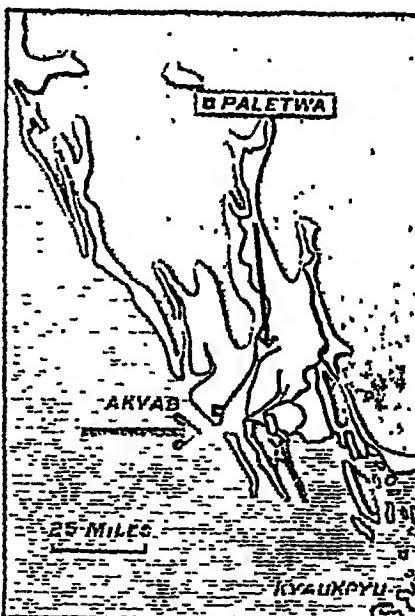


FIG. 100.—The position of Akyab. Land over 250 feet, black.

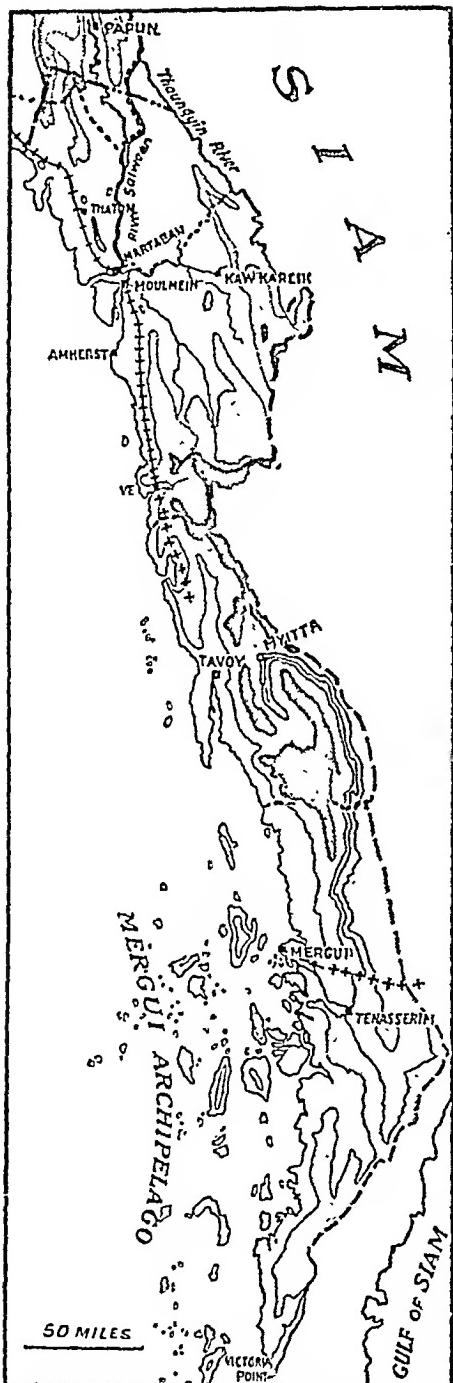


FIG. 191.—The Tenasserim Coastal Strip.

port because it has a small hinterland backed by high mountains. Some fishing is carried out along the coast. The only easy way between Arakan and the remainder of Burma is by sea.

The Tenasserim Coastal Strip also forms a narrow tract of land, stretching from the Siamese border to the Gulf of Martaban. In many respects it is like the Arakan coast. It is nearly everywhere hilly or mountainous: only in the north, around Moulmein, is there a stretch of flat land. The country is formed largely of ranges of hills running north to south and consisting of granite. Where the granite masses reach the sea they form rocky islands. Between the granite ranges is lower land consisting of old but softer rocks which have been worn away near the coast to form low islands or mangrove swamps. The great Salween River passes through the north of the

region, past the town of Moulmein, and empties itself into the Gulf of Martaban. A large part of the region is covered with dense evergreen forests. This part of Burma is getting near the equatorial region, and the rainy season is prolonged and the forest is of equatorial type. Everywhere the rainfall is more than 100 inches, and often more than 200. Rice is again by far the most important crop. Rubber plantations cover a considerable area. Less than one-tenth of the area is cultivated. The majority of the people live around the old port of *Moulmein*, but the harbour is becoming choked by mud brought down by the Salween and is not suitable for large ships. *Tavoy* exports the tin which is mined in the district. Farther south is *Mergui*, which may become an important port, because it is proposed to construct a railway from *Mergui* across to Siam. From the west bank of the Salween, opposite to *Moulmein*, there is a railway to Rangoon.

The Western Hills Region consists of a series of parallel ranges, sometimes rising, as in Mount Victoria, to 10,000 feet. The hills are difficult to cross, and there are only a few difficult mountain paths from one side to the other. From south to north there are the Taungup Pass, the An Pass, the Manipur Route, and the Tuzu Gap. The hills broaden out to the north, and the State of Manipur is situated on a broad plateau in the centre of the hills. The western slopes of the hills receive a heavy rainfall, but the rainfall rapidly gets less on the eastern side. The region is clothed mainly with a poor evergreen oak forest, of very little value. In places there are pine forests, but the forests are too difficult to reach for the timber to be of value. In the highest parts are rhododendrons and alpine shrubs. Large parts of the region are practically uninhabited. The few Chin inhabitants lead a miserable existence by growing a few crops on hillside clearings. The steep-sided valleys are often hot in the hot weather, but damp, cold, and feverish in the rains. There are really no towns in the region, but there is a line of large villages to be found where the hills regions pass into the plains.

These are frontier villages between the hills and the plains where the people from the one region meet those from the other to exchange goods. Examples are Saw, Gangaw, and Kalemyo.

The Shan Plateau is a broad area of old hard rocks, mostly 3000 feet above sea-level, but deeply entrenched by the deep, narrow Salween Valley, and by other river valleys. The western border is well marked, and the land drops rapidly to the level of the Irrawaddy and Sittang Valleys. The plateau receives a moderate rainfall and a large area of the waste land might be cultivated, but the land is very sparsely populated, and the Shans, Palaungs, and Was are not very progressive. Then there are considerable areas of grassland suitable for sheep, goats, and cattle. Especially in the valleys there are valuable forests, as yet little used. Mention has already been made of the mineral resources. Two railways penetrate into the plateau; one from Mandalay through the hill station of Maymyo to Lashio. Near this railway, and connected with it by a narrow-gauge line, are the Bawdwin Mines and Namtu Smelting Works. From Lashio a road runs on to the Chinese border, crossing the Salween at Kunlong Ferry (Kunlong Ferry Route). North of Lashio is the border town and market of Namkham. The other railway runs from the main Rangoon-Mandalay line through the hill station of Kalaw to Heho. A road goes on to Taunggyi, one of the most important centres in the Shan States, and on across the Salween to Kengtung, another important centre. From here is another route to China. To the north of the Shan Plateau lies the most important of the routes from Burma to China—along the Taping Valley through the town of Bhamo.

**The Northern Hills Region.**—This region stretches from the mountain wall which separates Burma from Assam and Tibet, as far southwards as the borders of the Dry Belt. To the west of the region lies the valley of the Chindwin; in the east the valley of the Irrawaddy. The region on the whole, therefore, slopes from north to south.

The rainfall in the north is heavy—more than 80 inches—getting less as one goes southwards. The hills are clothed with valuable forests and much teak is obtained from this region. In the north the country is wild, inhabited by a few Shans and Kachins, and is little known. In this northern region lies the small town of Pntao, 290 miles by mule track from the northernmost point of the railway. The terminus of the railway is at Myitkyina on the River Irrawaddy. The famous jade mines of Burma are in this region, and the jade is brought to Mogaung and sent to China through Bhamo. On the River Chindwin are several river ports such as Kalewa.

The Dry Zone is, next to the Deltas Region, the most important region of Burma. It is, generally speaking, a plain, and in the centre lies the isolated mountain of Monnt

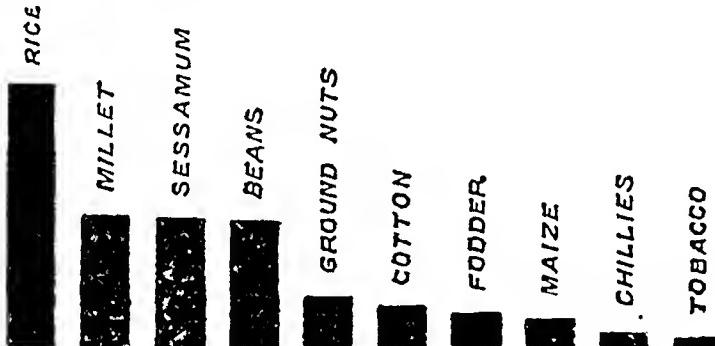


FIG. 192.—The crops of the Dry Belt.

Popa, nearly 5000 feet high. Mt. Popa is an old volcano, and lies at the northern end of the Pegu Yomas. The Dry Zone may be defined as the region of Burma which receives less than 40 inches of rainfall. In the centre the rainfall is as low as 20 inches. It is too dry for the proper growth of forests, and the natural vegetation is a poor scrub. One of the small trees is cutch, from which a yellow dye is made. Although it is so dry, there is a good population in the Dry Belt. Some parts, especially round Shwebo, south of Mandalay, and near Minbin, are irrigated and paddy is grown. In other parts the Dry Zone crops—

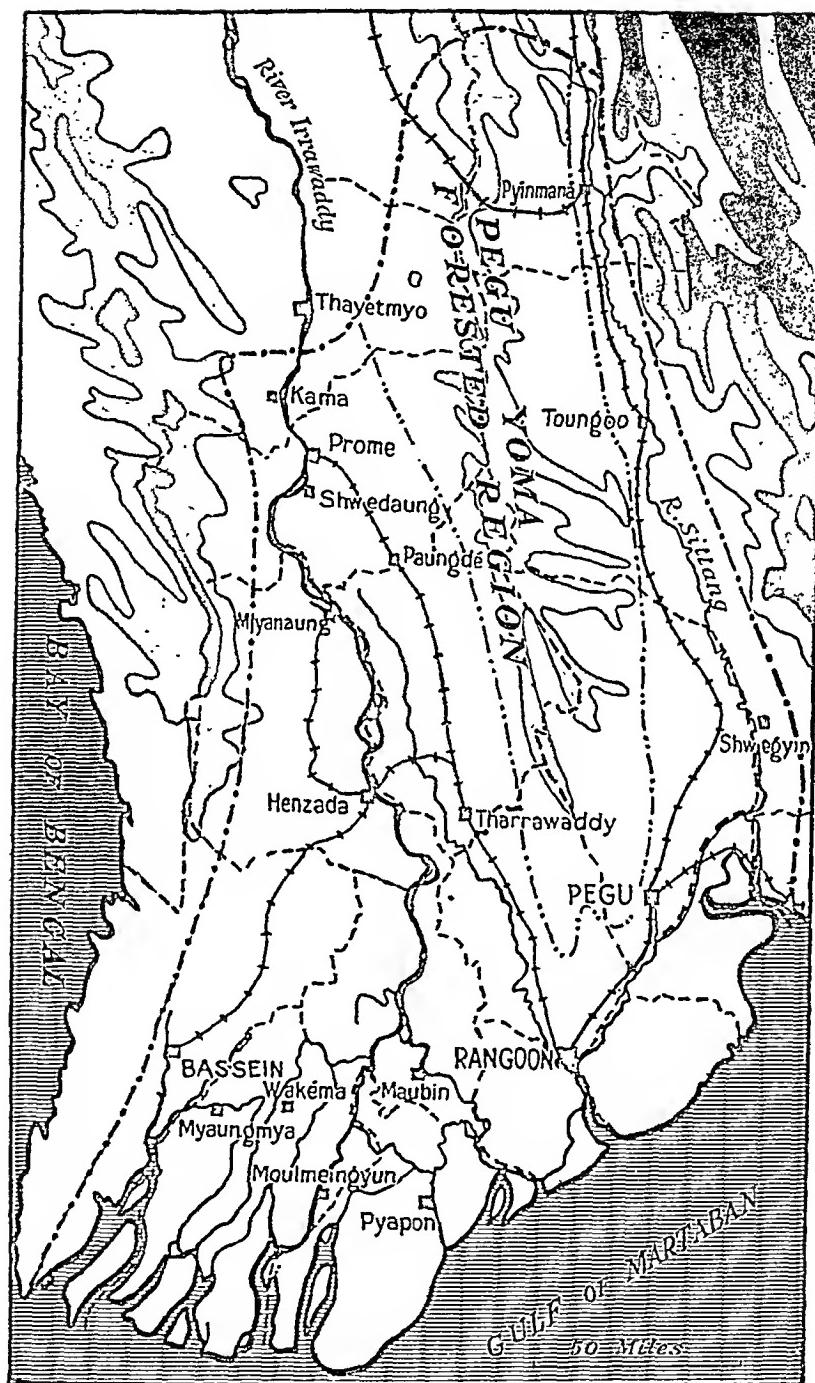


FIG. 193.—The Deltas Region.

sesamum, millet, beans, ground-nuts and cotton—are grown. The great oilfields of Burma are situated in the Dry Belt. The most important is Yenangyaung: others are Singu, Minbu, and Yenangyat. Most of the oil is sent by pipe line direct to the refineries at Rangoon. The main highway through the Dry Belt is the River Irrawaddy. Along it are numerous river ports—Myingyan, Pakoku, Magwe, Minbu, and Thayetmyo. The main railway from Mandalay to Rangoon serves the eastern part of the region, and a branch runs to Myingyan. The Dry Belt is the natural centre of Burma, and from it all parts of the country are easily reached. So we find the old capitals, such as Mandalay and Pagan, are in the Dry Belt.

The Deltas Region comprises the most important part of Burma. It consists of the broad valley of the lower

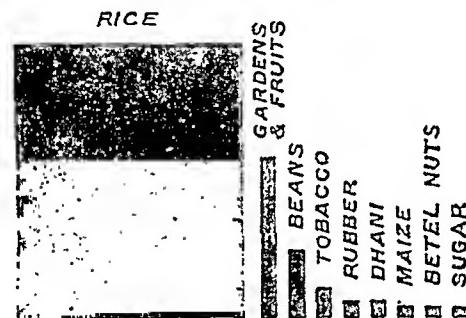


FIG. 194.—The crops of the Deltas Region.

course of the Irrawaddy and its large delta, and the narrower valley of the Sittang and the much smaller Sittang delta. Separating these two alluvial plains is the low range of the Pegu Yomas, covered with valuable forests. Rangoon is situated at the southern end of the Pegu Yomas, and so commands both valleys. The rainfall is good, over most of the true delta it is more than 80 inches, but decreases northwards. At the southern end of the Pegu Yomas evergreen forest is found, but farther north is Monsoon Forest of teak, pyinkado, and other valuable trees. It is

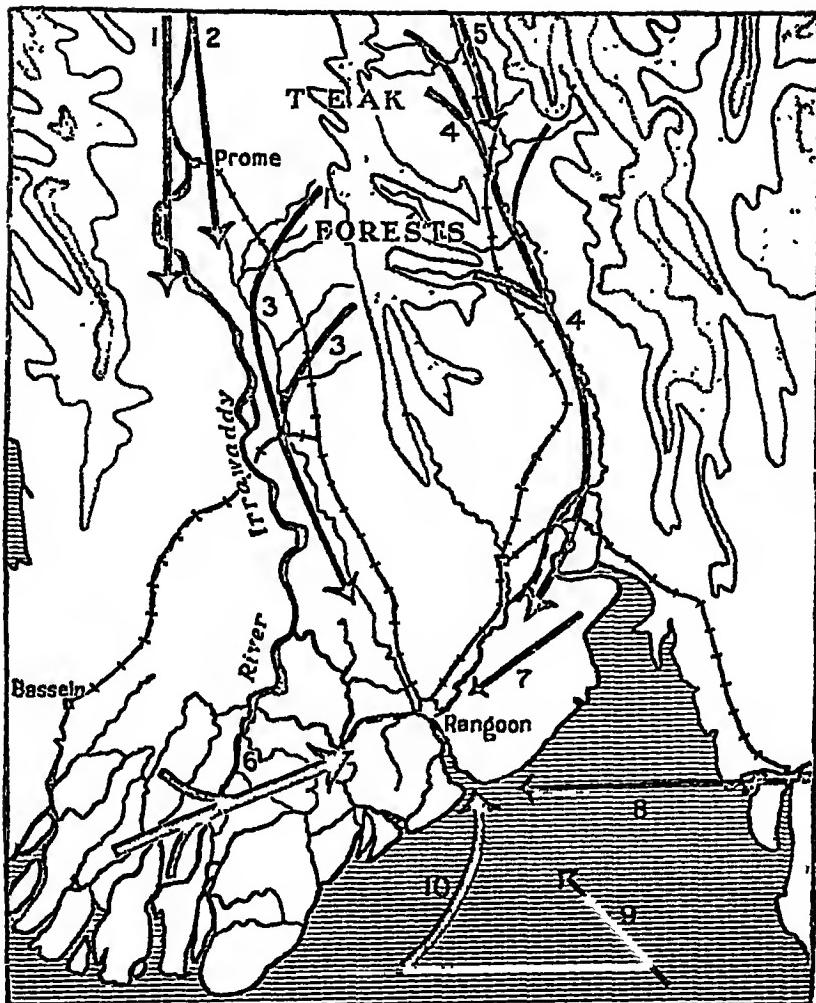


FIG. 195.—How the products of Burma reach Rangoon.

1. Products of the Dry Belt and timber from Upper Burma sent by river.
2. Oil from Yenangyaung and Singu sent by pipe.
3. Teak and other timber from the Pegu Yoma floated down the streams.
4. Railway from Mandalay bringing lead from Nantu, and many products of Upper Burma.
5. Paddy from the Delta sent by boat.
6. Paddy from the Sittang Valley and Delta sent by boat.
7. Paddy and timber from Moulmein.
8. Tin from Tavoy, also goods from Japan, China, and Java.
9. Steamers from the Arakan Coast, India, Ceylon, and Europe.

Notice that a town in any other position could not command the land and water highways of both the Irrawaddy and Sittang Valleys.

the nearness of these forests to Rangoon and the sea which has made them specially important. The lower, alluvial lands are almost entirely cultivated, and by far the most important crop is rice. All other crops are of little importance. This part of Burma is thickly populated, except in the forests. The cultivators are mostly Burmans. The towns of the region are mostly collecting centres for rice—examples are Hengzada, Bassein, Maubin, Pegu. Notice how well Rangoon is situated, so that it can collect the produce of nearly all parts of Burma and send it to foreign countries.

**Communications of Burma.**—The River Irrawaddy and its tributary the Chinwin are still the most important highways of Burma. Small boats can use many of the

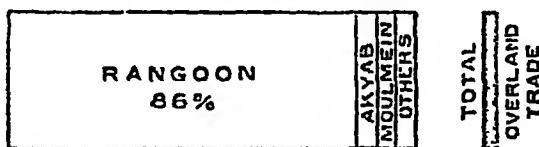


FIG. 196.—Trade of the sea ports of Burma (1922-3), with total overland trade for comparison.

smaller streams, and where the small streams join the main river, ports often spring up. Many of the creeks of the Irrawaddy Delta can be used by quite large steamers, and two canals have been cut to make the journey across the delta from Bassein to Rangoon shorter. The rice grown in the delta is brought to Rangoon by "paddy boats" through the delta creeks. Many of the small streams of Burma are used for floating logs of timber from the forests to the sawmills. The railways of Burma are all metre gauge. The main line does not run up the Irrawaddy Valley, but up the Sittang Valley to Mandalay. A fine new bridge, opened in 1934, now connects this with the continuation which runs to Myitkyina. Another line from Rangoon runs to Prome on the Irrawaddy, but the big oilfields and many towns of the Dry Belt can only be reached by river. Burma has very few roads. The roads

which exist are small local roads, and there is not even a main road between Rangoon and Mandalay. Three important roads penetrate the Shan Plateau—one to Mogok, one to Maymyo, and one to Taunggyi.

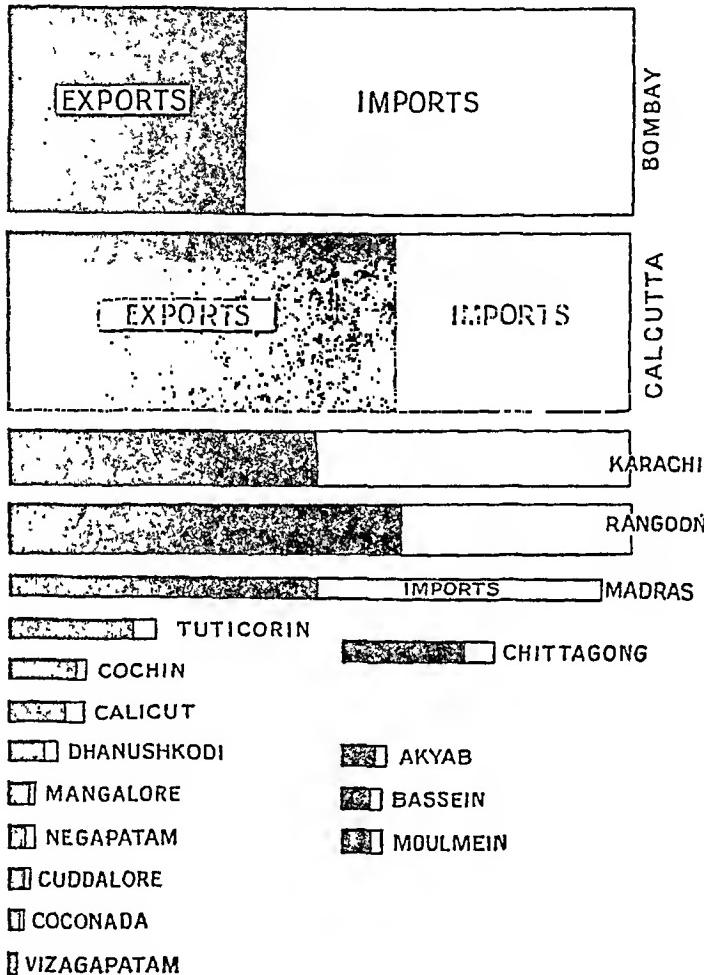


FIG. 197.—Trade of the principal ports of India (1927-8).

**The Trade of Burma.**—Burma has three main exports—rice, petroleum and its products, and teak. Much less important are cotton, lead, silver, etc. More than one-third of the exports of Burma go to India. Much of the rice is used to feed India and Ceylon. As with the other

ports of India, the imports of Burma are cotton goods (from India, Great Britain, and Japan), machinery (from Great Britain and United States), and coal. Most of the

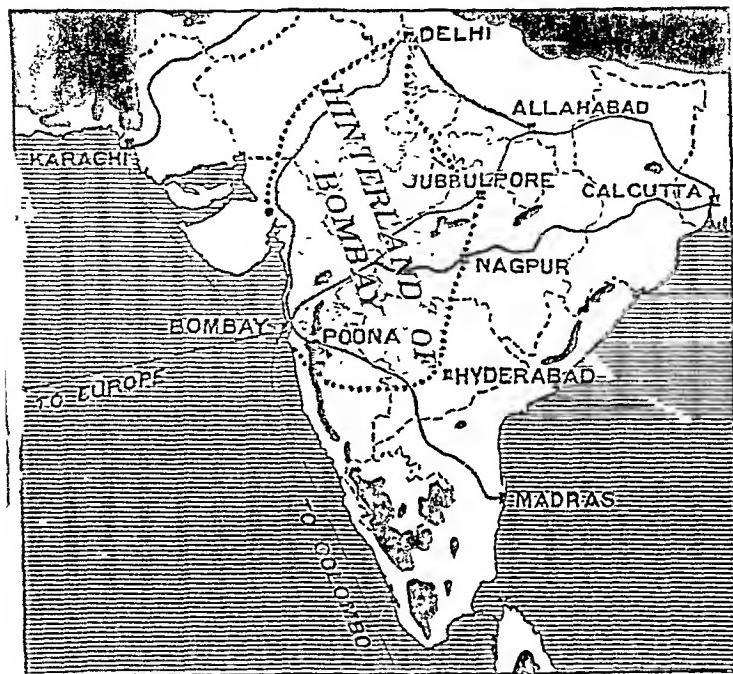


FIG. 198.—The Hinterland of Bombay.

Land over 2500 feet, black. Notice the railways from Bombay passing through gaps in the Western Ghats.

RAW COTTON	COTTON GOODS	COTTON SEED LINSEED GROUNDNUTS & SES. WOOL HIDES SKIN LEATHER	OTHERS
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FIG. 199.—The exports of Bombay.

trade of Burma passes through Rangoon (86 per cent.). The minor ports are Akyab, Moulmein, and Bassein. There is a small overland trade between Burma and China (through Bhamo) and between Burma and Siam.

#### TRADE AND COMMUNICATIONS OF INDIA

**The Foreign Trade of India.**—India is surrounded by a wall of mountains, so that nearly all the foreign trade of

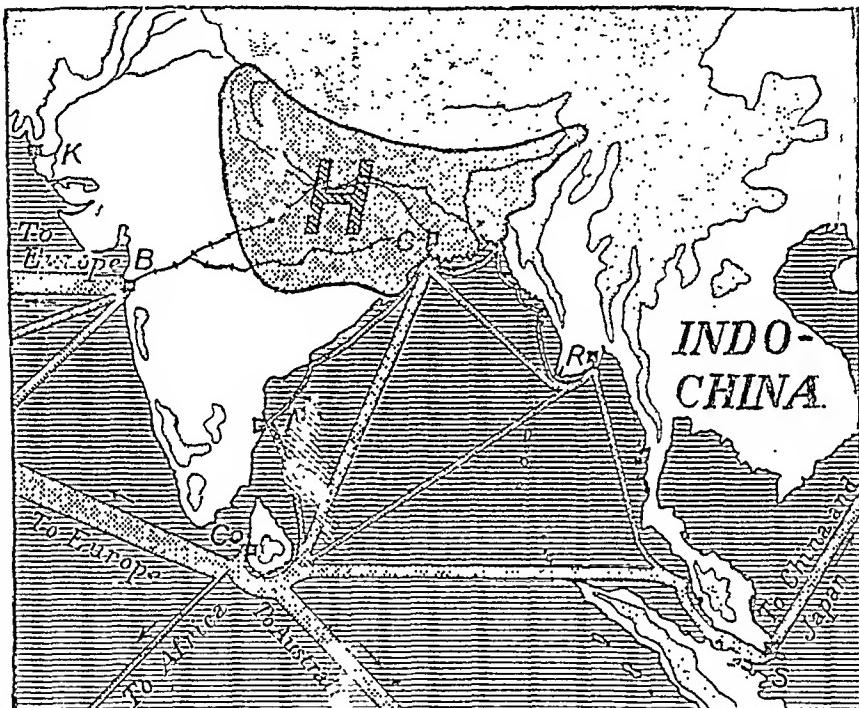


FIG. 200.—The Hinterland of Calcutta.

India is sea-borne. The surplus produce of India is taken away by ocean steamers, and nearly all foreign manufactured goods are received in the same way. Most of the trade passes through the main ports (Bombay, Calcutta, Karachi, Rangoon, and Madras), and Fig. 197 shows the relative importance of each.

	JUTE		TEA	LAC	OIL SEEDS	OTHERS
RAW	MANUFACTURED					

FIG. 201.—The exports of Calcutta (1922-6).

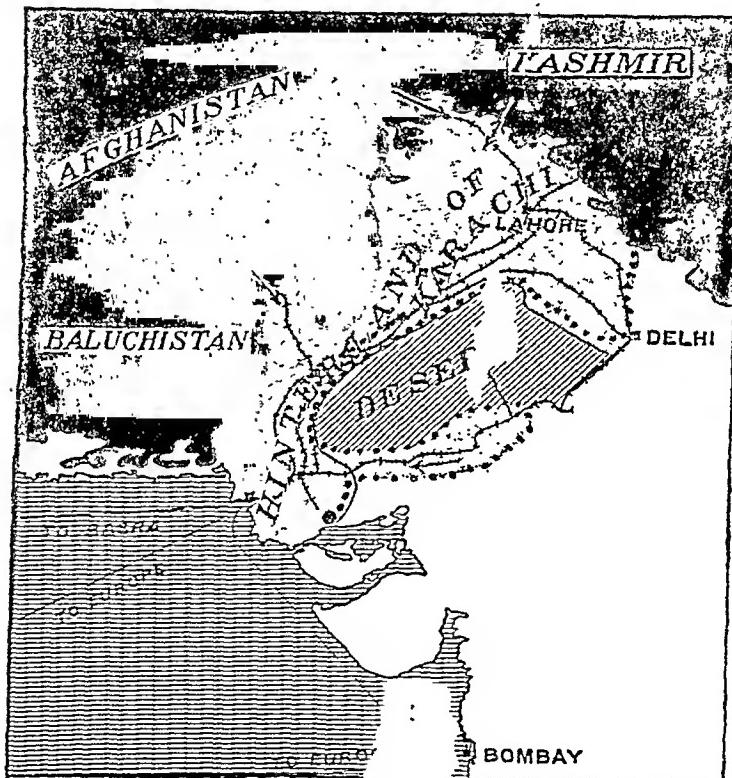


FIG. 202.—The Hind. and of Karachi.

**The Hinterland and Exports of Bombay.**—Each of the great ports sends away the products of its hinterland, so that the greatest export of Bombay is raw cotton. Bombay makes and exports a considerable quantity of cotton goods. Fig. 199 shows the exports of Bombay. Figs. 199, 201, 203–205 are drawn on the same scale, so that the exports of the different ports can be compared.

**The Hinterland and Exports of Calcutta.**—The most important crop in the Ganges Delta is rice, but Calcutta does not export any rice. It is all required to feed the great population. By far the most important export is jute—mainly raw jute, but also some manufactured into cloth and gunny bags. Large quantities of tea from Assam, lac from the Chota Nagpur Plateau, and oil-seeds from the Middle Ganges Valley are also sent away from Calcutta.

**The Hinterland and Exports of Karachi.**—Karachi exports the surplus cotton and wheat grown in the Punjab, as well as barley and oil-seeds.

RAW COTTON	WHEAT	OIL SEEDS	WOOL	BARLEY	GRAM	OTHERS
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FIG. 203.—The exports of Karachi (1922–7).

**The Hinterland and Exports of Rangoon.**—It has already been explained that the exports of Rangoon—rice, petroleum, and timber—are sent in large quantities to other parts of India.

RICE	PETROLEUM	COTTON	TEAK	OTHERS
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FIG. 204.—The exports of Rangoon (1922–7).

**The Hinterland and Exports of Madras.**—The trade of Madras is small when compared with Bombay or Cal-

cutta. It has a much less fertile hinterland. The leading export is leather.

LEATHER	SKINS	OIL SEEDS	RAW COTTON	COTTON GOODS	OTHERS
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FIG. 205.—The exports of Madras (1922-7).

**The Exports of the Whole of India.**—If we take India as a whole, the most important export is raw cotton, followed by jute, rice, tea, oil-seeds, wheat, etc.

**The Imports of India.**—India is essentially an agricultural country, and exports raw material and foodstuffs.

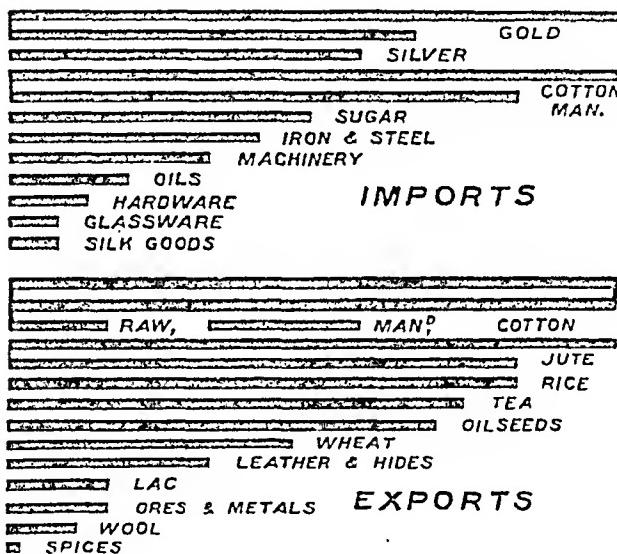


FIG. 206.—The trade of India. Principal articles.

Consequently the main imports are manufactured goods. At all ports cotton goods take the leading place, followed by iron and steel goods and machinery. India does not grow nearly enough sugar-cane, and imports of sugar are important. It should be noticed that Bombay imports

most of the gold and silver used in India. India uses huge quantities both of gold and silver.

**The Trade of the Minor Ports.**—As a rule the exports of the small ports are greater than the imports, because the exports are taken away by small boats, but the big steamers from Europe and America do not visit the small ports.

**The Trade of India by Countries.**—Figs. 207 and 208 show the chief customers for India's exports and the chief countries who send her goods. Notice what a large proportion of the trade is with other countries of the British Empire. This is a great advantage, for the money concerned is kept in the Empire and helps to build up more trade.

**Shipping.**—A great proportion of the shipping which visits Indian ports is British or British Indian.

**The Overland Foreign Trade of India.**—Owing to the mountain wall the trade

FIG. 208.—The trade of India by countries (exports).

GREAT BRITAIN	
REST OF BRITISH EMPIRE	
JAPAN	
JAVA	
GERMANY	
U.S.A. BELGIUM	
OTHER FOREIGN COUNTRIES	

FIG. 207.—The trade of India by countries (imports).

TREASURE	
BRITISH EMPIRE	
FOREIGN COUNTRIES	

GREAT BRITAIN	REST OF THE BRITISH EMPIRE	JAPAN	U.S.A.	GERMANY	ITALY	FRANCE	EGYPT	OTHER FOREIGN COUNTRIES
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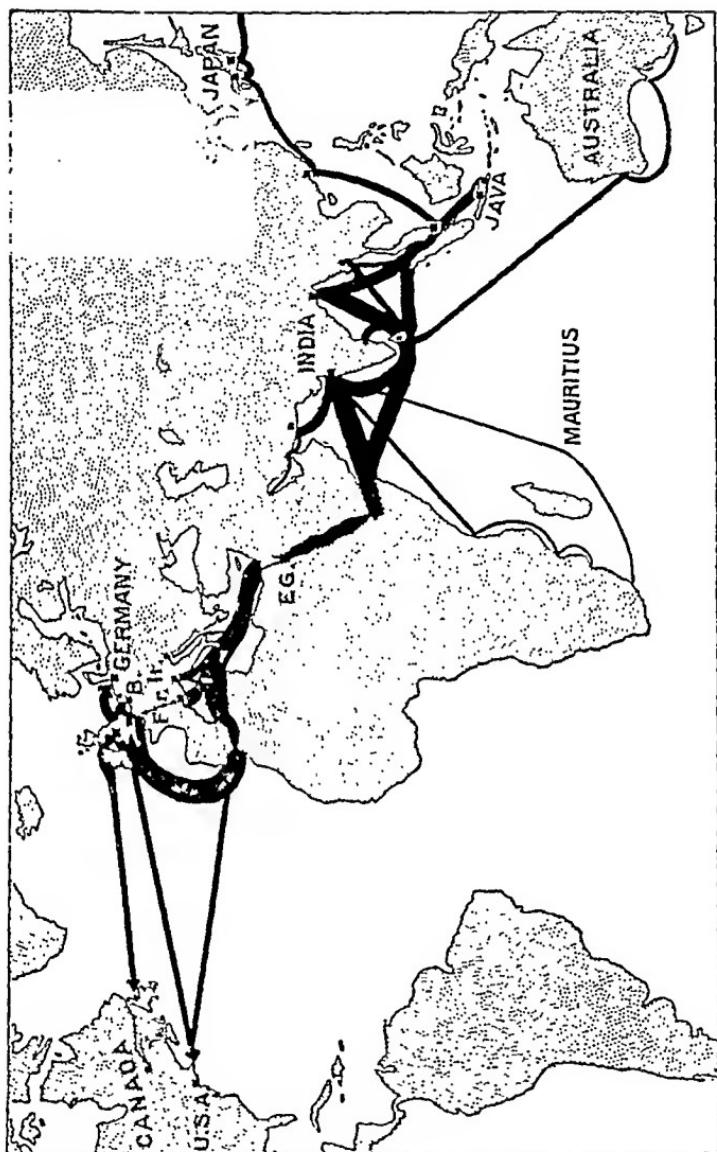


FIG. 209.—Trade routes from India.

The principal world ports which have a large trade with India are marked by a square dot, identify them from an atlas. Notice the railway across France over which the mails from India to England travel.

which passes over the land frontiers of India is very small. There is a small trade with :

(a) Persia through Baluchistan. This trade has increased greatly since the railway was continued through Baluchistan.

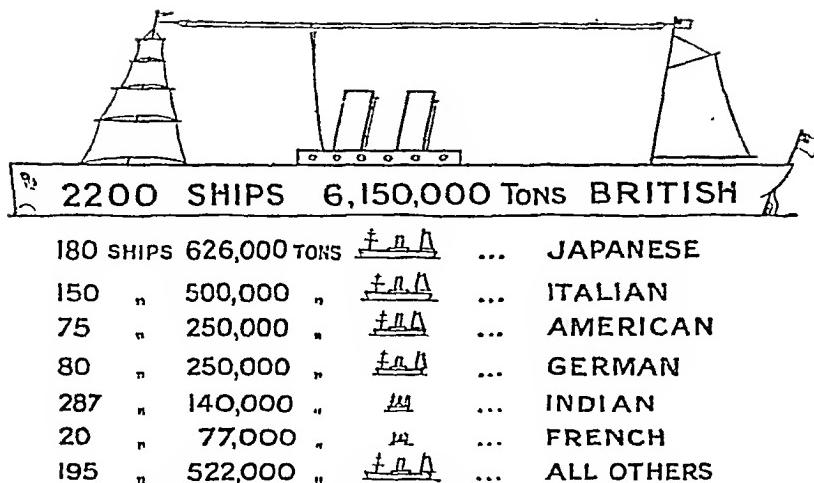


FIG. 210.—Ships which visited Indian ports in 1924–25.

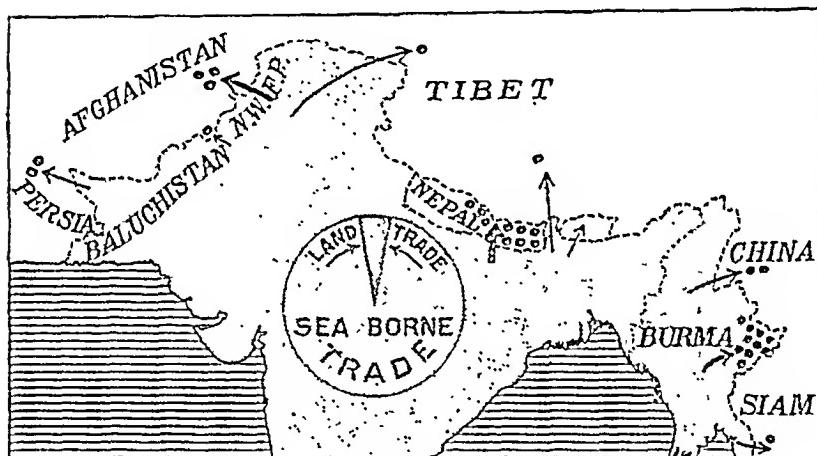


FIG. 211.—The overland trade of India.

Each dot represents trade to the value of roughly one crore of rupees.

- (b) Afghanistan, mainly through the Khyber Pass.
- (c) Central Asia through Kashmir.
- (d) Nepal.
- (e) Tibet, especially through Darjeeling.
- (f) China from Burma, especially *via* Bhamo.
- (g) Siam from Burma.

Fig. 211 shows the relative value of the trade with the various countries. It is only about 6 per cent. of the sea-borne trade. Most of the local trade between the various Provinces of India is by railway. In Burma the trade between different parts is largely by the River Irrawaddy. There is only a very small trade across the mountain wall between India and Burma.

### THE COMMUNICATIONS OF INDIA

**Railways.**—By far the most important means of communication in India is the railway. India has now 38,000 miles of railway. There are two gauges :

(a) The broad gauge, 5 feet 6 inches, including all the more important lines and more than half the railways of India.

(b) The metre gauge, 3 feet 3 $\frac{3}{4}$  inches, used mainly for branch lines.

Some of the hill railways are on a still smaller gauge. Most of the important railways of India run from the chief ports to different parts of their hinterlands, and it is simplest to study the railways by taking each of the great ports in turn.

**Railways serving Calcutta.**—There are four main railways radiating from Calcutta and Howrah :

(a) The Eastern Bengal Railway (E.B.R.) runs to the north to Darjeeling and north-east (Assam). At Sara there is a bridge across the Ganges, but in other places the railway is interrupted by the broad stream of the Ganges or Brahmaputra. A small line runs from Assam to the port of Chittagong (the Assam-Bengal Railway).

(b) The East Indian Railway (E.I.R.) runs from Howrah up the Ganges Valley to Benares (here is the first railway bridge across the Ganges ; there is no railway bridge between Sara and Benares over the Ganges), Delhi, and the Punjab.

(c) The Bengal-Nagpur Railway (B.N.R.) runs from

Howrah right across the Plateau to Nagpur and is continued to Bombay.

(d) The Bengal-Nagpur Railway also runs from Howrah to Vizagapatam down the east coast.

In the Ganges Valley there is a network of metre-gauge railways north of the river (Bengal and North-Western Railway, etc.), but most of the lines south of the river are broad gauge.

**Railways serving Bombay.**—There are four main lines radiating from Bombay :

(a) The Bombay Baroda and Central India Railway (B.B. & C.I.R.) goes north to Baroda and Delhi.

(b) The Great Indian Peninsular Railway (G.I.P.R.) goes north-east to Jubbulpore, where it joins the E.I.R. and runs on to Allahabad. This is the route followed by the mail-trains from Bombay to Calcutta.

(c) The G.I.P.R. also goes east to Nagpur.

(d) The G.I.P.R. has another main line going south-eastwards to Raichur, where it joins the M. & S.M.R. to Madras.

All these lines are broad-gauge lines.

**Railways serving Karachi.**—Karachi really has only one railway, the North-Western Railway, which runs to Hyderabad. From Hyderabad there are two main lines, one to Delhi, the other up the Indus Valley to the Punjab. Then N.W.R. has a network of lines in the Punjab, and a branch to Baluchistan.

**Railways serving Madras.**—Four main lines radiate from Madras :

(a) The Madras and Southern Mahratta Railway runs northward to Vizagapatam and joins the B.N.R. (to Calcutta).

(b) The M. & S.M.R. also runs north-westwards to Raichur and joins the G.I.P.R. to Bombay. There is also a branch to the Portuguese territory of Goa.

(c) The South Indian Railway runs westwards, through the Palghat Gap, to the west coast.

(d) The S.I.R. (metre-gauge main line) runs southwards

to Dhanushkodi (the mail port for Ceylon), Tuticorin, and Trivandrum.

Apart from these main lines, shown on Fig. 212, there are large numbers of branch lines in all the more thickly populated parts of India. The railways of Burma

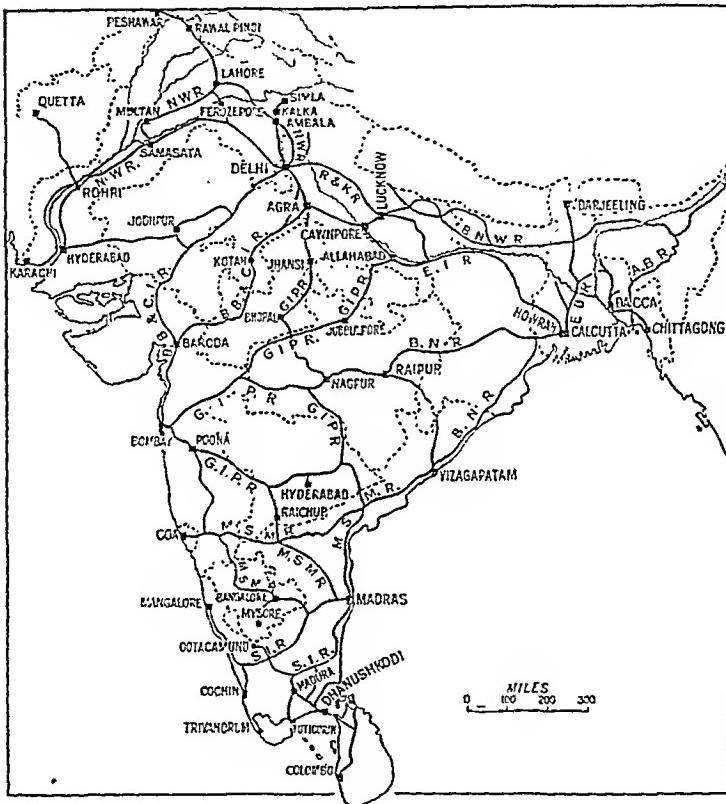


FIG. 212.—Railway map of India.

have already been mentioned. Remember there is at present no railway connecting India and Burma, and no railway connecting India with any other country.

**Roads.**—When compared with other civilised countries, India has very few metalled roads. There are a few

"trunk roads," such as the one from Calcutta to Peshawar, which were commenced before the days of railways, but often even the trunk roads are badly in need of repair. Most of the metalled roads of India are found round the larger towns, or acting as "feeders" to the railways—that is, goods are brought along the roads to the nearest railway station.

**Rivers.**—It has already been explained that the rivers are much less important than formerly owing to the growth of the railways, and the use of river water for irrigation. The largest system of river transport is found on the Irrawaddy, in Burma, and on the River Ganges and branches below Patna. Except for the Calcutta and Eastern Canals, the canals of India are little used for transport; they are for irrigation. Note, however, the Buckingham Canal, a salt-water navigation canal running north and south through Madras and close to the coast.

## CEYLON

**Position.**—Ceylon is a large island situated to the south of Peninsular India. It must once have been joined to India, and in many ways it is very similar. Ceylon is shaped like a pear and is a little smaller than the State of Mysore, its area being about 25,000 square miles. The distance from north to south is 270 miles. It is farther south than any part of India or Burma, and Colombo is only 7° N.

**Physical Features.**—In its physical features Ceylon is very simple. It consists of a central mass of mountains, surrounded by broad costal plains. Many of the central mountains are high, the highest is more than 8000 feet. In the north the coastal plain is quite flat and there are several sandy peninsulas. The end of the Mannar peninsula is only 22 miles from the nearest point of India (Dhanus-bkodi). Ceylon is very nearly joined to India between these

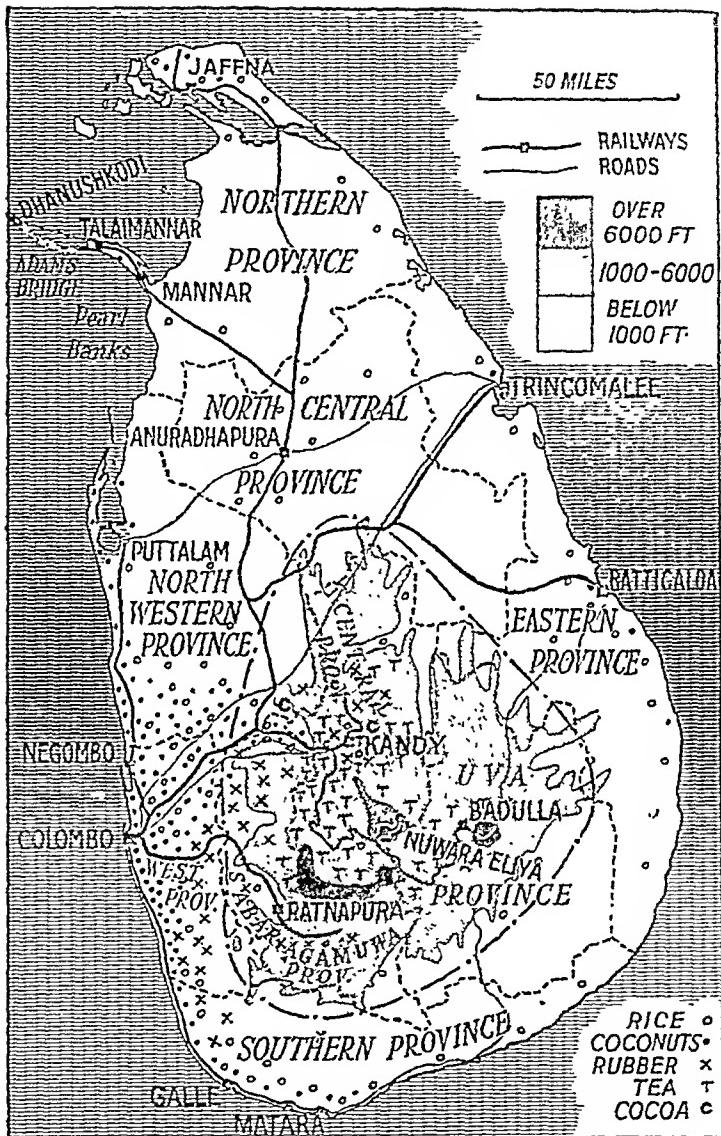


FIG. 213.—General map of Ceylon.

Each dot or symbol for rice, coconuts, rubber, etc., represents 10,000 acres.

two points by a line of sandbanks and rocks called Adam's Bridge.

**Geology.**—The mountains of Ceylon consist of the same old, hard, crystalline rocks as the Decean. These rocks also underlie the coastal plain, but there they have been covered by a thick coat of *laterite*. Laterite is a rock which is formed in hot, wet countries by rain acting on other rocks. The old crystalline rocks at the surface have been completely changed by the action of rain-water and turned into a much softer, red or brown rock, full of holes. In the north of the island the old rocks have been covered by soft limestone. Round the island there are many sand dunes. The old, crystalline rocks of Ceylon are noted for their beautiful gemstones and for the mineral graphite.

**Climate.**—Ceylon is nearer the equator than any part of India, and so is hot all the year round. The presence of the sea keeps the climate equable, and everywhere along the coast land and sea breezes are felt. There is very little difference between the temperature of day and night, that is, the "daily range" is very small. At Colombo it is only 12 degrees. The annual range is also very small. January is the coolest month (80 degrees), and May the hottest, but at Colombo there is only a difference of 5 degrees between the two.

The western coast of Southern India gets a heavy rainfall from the South-West Monsoon, whilst the eastern coast gets much of its rain in the months of November, December, and January, when the North-East Monsoon has begun to blow. Ceylon gets its rain from both monsoons. There is a heavy rainfall on the west and south-west coasts and the mountains from the South-West Monsoon. There is a heavy rainfall on the north-east coast and eastern slopes of the mountains later in the year from the North-East Monsoon. The northern part of the island has no hills to intercept the winds, and is a dry region. So also is the south-eastern part of the island. Thus, although Ceylon is not a very large island, its climate varies.

**Vegetation.**—Just as the climate of Ceylon varies

a great deal, so does the natural vegetation. The lower slopes of the mountains used to be covered with thick evergreen forest. Now many of these forests have been cleared away to make room for rubber plantations and tea gardens, and there is little timber of value left. The wetter parts of the lowlands were also covered with wet evergreen forests, and the drier parts with scrub forests. A great part of the wetter land is now used for rice and coconuts, but the drier parts are still untouched.

Taking the whole of Ceylon, about one-fifth is cultivated. Thick forests cover about one-fifth of the area, and there is a large amount still covered by waste land which might be used.

**Population.**—There are rather over 4½ million people in Ceylon. The principal race is the Sinhalese, or Ceylonese, who, between 2000 and 3000 years ago, came from the north of India and conquered Ceylon. The Sinhalese are Buddhists by religion. At Kandy is the Temple of the Tooth, where a tooth of Buddha is preserved, and which is one of the most sacred places in the world to Buddhists. The north of Ceylon is inhabited mainly by Tamils, who are Hindus by religion, and who came over from India either as conquerors in past ages, or more recently as labourers in the tea gardens, coffee and rubber estates. The Moors are Mahomedan traders, boatmen or fishermen who came originally from North Africa. The descendants of the old Portuguese and Dutch settlers are called Burghers. In the wilder parts of the mountains there are still a few Veddas, a very primitive hill tribe. The people live mainly on the wetter parts of the plains and on the hills. On the dry, infertile soils of the northern regions and the east there are very few people.

**Government.**—Ceylon is entirely separated from India in matters of Government. The first Europeans to settle in the island were the Portuguese in 1505, followed by the Dutch, and later by the English. The old Dutch ports are still to be seen at Galle and other places. Ceylon was separated from the Presidency of Madras in 1802

and made a Crown Colony, and so became a separate country of the British Commonwealth. It is ruled by a Governor and an Executive Council, with a Legislative Council elected by the people.

Natural Regions.—Ceylon, though only a small country, must be divided into at least three natural regions :

- (1) The Hill Country, comprising the central mountain mass of the island, roughly the land over 1000 feet.
- (2) The Maritime Belt, or Coastal Plain of the east, south, and west.
- (3) The Northern Limestone Plain, occupying the northern end of the island.

The Hill Country.—The Hill Country is formed by the mountainous centre of the island. It consists of a series of ridges, separated by deep valleys, running roughly from north-east to south-west. Very little is now left of the vast forests which covered this region before the days of European planting. The trees are nearly all evergreen, and get smaller the higher one goes, so that above 5000 feet the trees are too small to be useful as timber. At intervals there are broad, marshy or grassy plains, like that of Nuwara Eliya and the Horton Plains, surrounded by mountains. The rainfall of most of the region is heavy; the rain does not fall so heavily as on the plains, but is more continuous, and for days, or even weeks together, the sun may be hidden by dense clouds of mist. The greater part of the rain falls during the South-West Monsoon, from June to October. Most of the rubber plantations are found in this region, especially on the western side, as well as nearly all the tea gardens. The latter are most numerous between Kandy and Nuwara Eliya. North and north-east of Kandy the cacao tree is grown, from which cocoa is obtained. Many of the valley sides are steep, but are very carefully terraced for the growth of paddy. A large amount of coffee used to be grown in Ceylon, but, as in South India, it is no longer important.

The old hard rocks which make up the mountain country are famous for gemstones, sapphires, spinel rubies, moonstones, etc. There are hundreds of small gem-quarries, especially where the gems have been washed out of the old rocks and into the gravels of the valleys, as around Ratnapura. Another important mineral is graphite, used for making lead pencils. The most important mines are in the Kurunegala district.

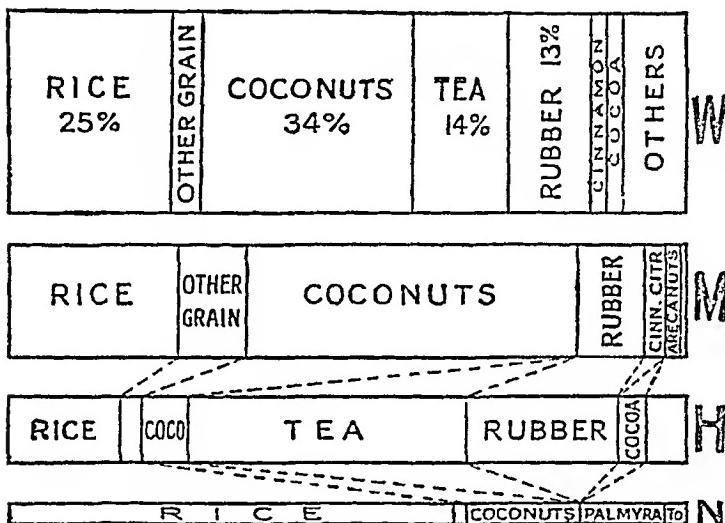


FIG. 214.—The crops of Ceylon.

W = the crops of the whole of Ceylon.

M = the crops of the Maritime Region.

H = the crops of the Hills Region.

N = the crops of the Northern Region.

Kandy, the old capital, is in this region, and is reached by a wonderful hill railway from Colombo, 72 miles away. Nuwara Eliya is a well-known hill station.

**The Maritime Belt.**—All round the mountainous centre of Ceylon there is a broad belt less than 1000 feet above sea-level, which we may call the Maritime Belt, or coastal plain. Over this stretch the old hard rocks are hidden by deep red soil of laterite. All along the

coast, thrown up by wind and waves, there are lines of sand dunes. Just as on the west coast of India, large brackish lagoons are found behind the sandy ridges. The climate of the maritime belt varies greatly. The western and south-western sides get a heavy rainfall from the South-West Monsoon, the south-eastern side is dry, whilst the eastern side is again wetter, receiving its rain largely in November and December from the North-East Monsoon. The wet low country is thickly populated and widely cultivated, especially on the west and south-west of the island. The level lands and the valleys are occupied by rice-fields, yielding two crops a year, one after each monsoon. The higher lands towards the hills are covered by the mixed tree cultivation of the Sinhalese. Each farmer has coconuts, areca nuts, maugoes, jaks or breadfruit, together with yams and small plants like pepper. On the borders of the hill country are rubber and tea plantations. All along the coast are groves of coconuts. The husks are allowed to soak and rot in the shallow lagoons, and so the fibre (coir) is obtained. Industries connected with the coconut find employment for a large number of people. The kernels are roughly dried for export as copra. Even more important is the export of carefully dried or "desiccated coconut" prepared in factories : there are also factories for the preparation of coconut oil. The preparation of coir is mainly a cottage industry. Areca nuts are also grown for export. Of the spices for which Ceylon has long been famous, cinnamon is the most important. The cinnamon tree likes a very light sandy soil, and grows in those parts of the maritime belt where such a soil is found. The industry is less important than formerly. The cinnamon of commerce is obtained from the inner bark of young shoots. Other spices are cardamoms, cloves, etc. Citronella oil, prepared from a grass, is obtained mainly in the south-west of the island. The parts of the maritime belt away from roads and railways, especially in the dry parts of the south-east and in the east, are very thinly populated, and

there is much waste land. This year (1925) a railway has just been completed across the island to Trincomali, and should do much to open up the country. There is a branch to Batticaloa.

Round the coast fishing is an important industry. The boats of the fishermen are made either of stems of palm tree or planks of wood, and are very narrow. They would roll over in the water, but they have a log of wood on one side, which forms a float. The float is not tied close to the boat itself, but 6 to 12 feet away, so that the boat is really like two boats joined together by two cross poles, except that one of the boats is only a log of wood.

The capital of Ceylon—Colombo—is on the west coast. There is a bend on the coast which partly shelters a small harbour from the force of the South-West Monsoon. Now a fine breakwater encloses an artificial harbour, and Colombo is not only the principal port of Ceylon, but is situated on a great ocean highway from Europe to the Far East. Colombo is a sea junction, like a railway junction, but on the sea routes of the world, for here the main trade route goes on to Singapore and China; but there are branches from Colombo to Madras and Calcutta, to Rangoon, and an important one to Australia.

Before the harbour of Colombo was finished, Galle used to be the principal port of call. It has a pretty natural

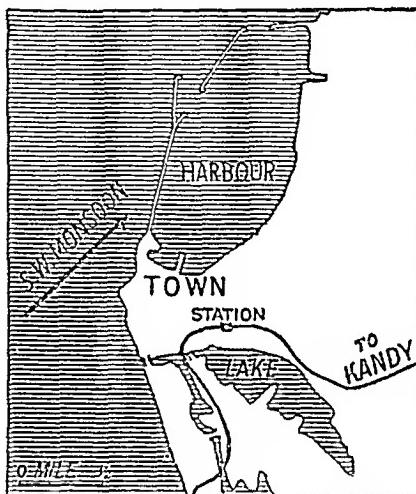


FIG. 215.—Sketch map of Colombo Harbour, showing how it is protected from the South-West Monsoon.

harbour, but one with a dangerous rocky entrance. The entrance is guarded by an old Dutch fort.

Trincomali, on the north-east coast, has a fine large natural harbour, but its hinterland is not important and the port is little used.

**The Northern Plain.**—Covering the whole of the north of Ceylon is the northern Limestone Plain, which does not rise more than 200 or 300 feet above sea-level. The plain is formed by a pale limestone, sometimes covered by a thin bright red soil. Round the coast are sand dunes. Most of this region gets about 40 inches of rain, but the soil is dry and poor, and there is much waste land covered with scrub jungle. The palmyra palm flourishes in this northern region. Cultivation is protected by numerous "tanks," mostly very old. Jaffna, situated on the Jaffna peninsula, is the most important town in this natural region. At the end of the Peninsula of Mannar is Talaimannar, the terminus of the Ceylon Government Railways, where steamers run daily to Dhanushkodi, 22 miles away, the terminus of the South Indian Railway. South of the Mannar Peninsula is an area of shallow sea (the Gulf of Mannar) famous for its pearl fisheries.

**Communications.**—Colombo is the centre of the broad-gauge Ceylon Government Railways. One line runs southwards along the coast to Galle and Matara, whilst the main line runs north-eastwards through the old historical town of Anuradhapura to Jaffna, with a branch to Talaimannar. Another line runs from Colombo up to Kandy, and winds amongst the hilly country to Badulla, with a small branch to Nuwara Eliya. There are numerous excellent roads in Ceylon which link up outlying places with the railways.

**The Trade of Ceylon.**—In value the trade of Ceylon is roughly the same as that of Karachi or Rangoon. Nearly all the trade passes through the great port of Colombo. Before the construction of the fine harbour of Colombo, a large percentage of the trade went to the port of Galle. But notice, on Fig. 213, the position of Galle. It has

a fine natural harbour with a narrow rocky mouth. The South-West Monsoon blows directly on to the entrance to the harbour, and makes it dangerous to shipping. Like Burma, Ceylon has three main exports (see Fig. 216)—tea, coconut products, and rubber. Although Ceylon has

TEA	RUBBER	COCONUT PRODUCTS	OTHERS
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FIG. 216.—The exports of Ceylon.

RICE	COTTON GOODS	COAL	SUGAR	OTHERS
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FIG. 217.—The imports of Ceylon.

not a very large population, it does not grow enough food for its people, and imports much rice, especially from Burma. The other imports are similar to those of India. Notice the position of Colombo, at a meeting point of many trade routes. It is a port of call for many steamers, and is visited by more steamers than any port in India.

#### QUESTIONS AND EXERCISES

1. Give an account of the causes of the South-West Monsoon. How does it affect India?
2. In what ways has the topographical (physical) structure of India affected her history and commerce?
3. "Burma, although included in the Indian Empire, is in reality a separate country." Discuss this statement.
4. Draw from memory a map of the Indian Empire showing the mountains, valleys, plains, and hills: the passes through the mountains and the chief railways.
5. Compare and contrast Calcutta and Colombo as world ports.
6. Show by a series of sketch maps, drawn from memory, the connection between rainfall and the chief grain crops of the Indian Empire.
7. Divide India into major natural regions, and describe in detail the one in which you are living.
8. If you were a farmer and could choose a farm anywhere in the Indian Empire, where would you select for your farm (give reasons), and what crops would you grow?

9. Write an account of the mineral resources of the Indian Empire. Illustrate your answer by sketch maps.
10. In what ways has the foreign trade of India changed within the last hundred years?
11. Compare and contrast the valleys of the Indus and Ganges Rivers from the economic and historical points of view.
12. Write a brief account of the climate of Ceylon. Illustrate your answer by sketch maps.
13. What are the chief products of Burma? Where are they produced? For what are they used? To which countries are they sent?
14. There are several different types of forests in the Indian Empire. Where exactly do these forests occur and what is their value to man?
15. Give a brief account of the different types of people who live in the Ganges Valley.
16. Of what commercial value to India is Peninsular India?
17. Which do you consider to be the eight chief ports of the Indian Empire? Write short notes on each showing your reasons for your selection.
18. In what ways might the trade between India and Burma be increased?
19. How did the last great European war affect India's foreign trade?
20. Describe, with the help of sketch maps, the connection between the climate and the natural vegetation of the Indian Empire.

## INDO-CHINA

Between India and China there is a large peninsula projecting southwards. It is really a broad peninsula in the north (Indo-China) with a long narrow peninsula (Malay Peninsula) stretching southwards almost as far as the equator. The broad northern part has a typical monsoon climate; the narrow Malay Peninsula is in the equatorial regions. Notice that the Province of Burma is part of the broad peninsula. It is interesting to note that the French often called Burma "British Indo-China." The other two countries of Indo-China are the independent kingdom of Siam and the French colony—French Indo-China. The equatorial regions of Malaya are occupied mainly by the British colonies of the Federated Malay States and Straits Settlements.

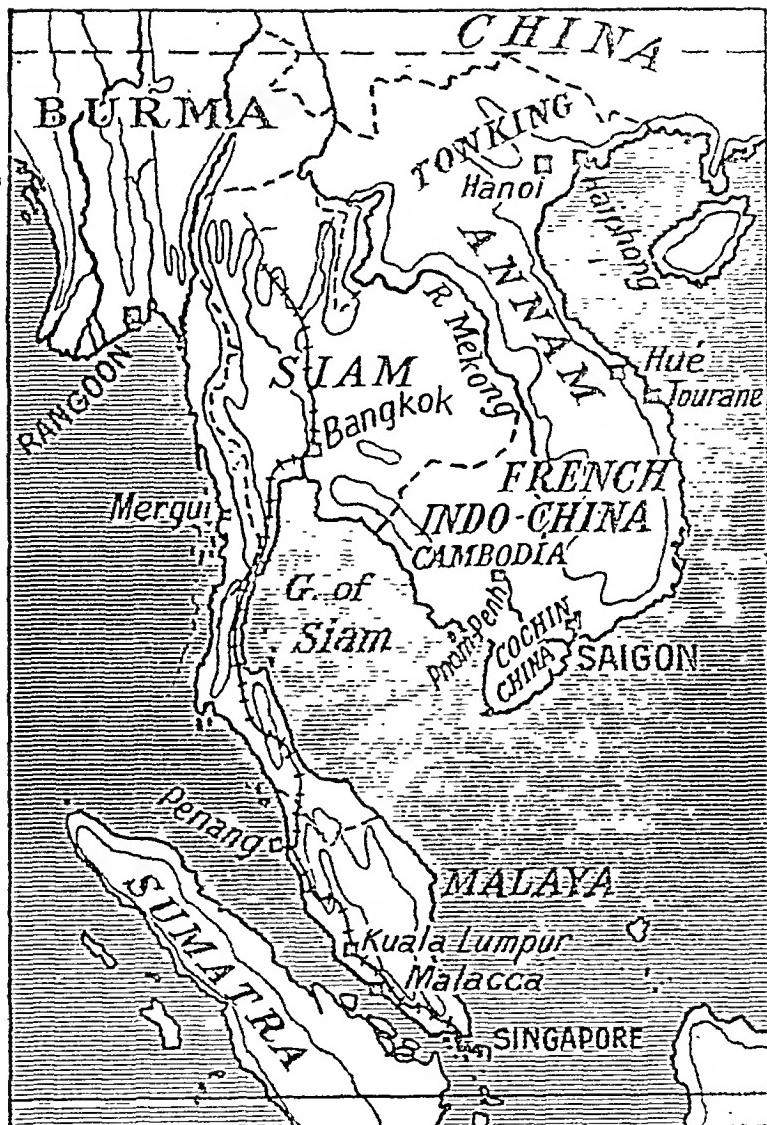


FIG. 218.—Map of Indo-China.

Notice the three countries—Siam, Malaya, and French Indo-China—into which it is divided. Land over 1000 feet is dotted. Follow the railway from Bangkok to Singapore and see what a good port Mergui (in Burma) would make for Siam if it were connected by railway. What are the lines marked across the north and south of this map?

### SIAM

Siam is, on the whole, a lowland country, lying between the Tenasserim Yomas on the Burmese border and the mountains of French Indo-China. Siam has the same seasons as India. When the North-East Monsoon is blowing Siam lies in the rain-shadow of the Annamese Mountains, but from June to September the warm, moisture-laden winds blow up from the Gulf of Siam and deposit a heavy rainfall.

Rice is grown over the flat lands; it is by far the most important crop, the staple food of the people, and the principal article of export.<sup>1</sup> The hills of Upper Siam are forest-covered, and much teak is worked. The logs are floated down by river to Bangkok. In Lower Siam, lying between Lower Burma and Malaya, much tin and wolfram are produced. The Siamese are very similar to the Burmans, and they are Buddhists. Notice how extraordinarily alike Burma and Siam are. Bangkok, the capital and principal port, lies a few miles up the River Menam<sup>1</sup>; but the river is shallow, and has a sand bar near the mouth. There is a railway from Bangkok to the north of the country, and a railway runs right through to Singapore. As in Burma, the imports are cotton goods, foodstuffs, metals, and machinery. Most of the trade is with Hong Kong, Singapore, India, and Great Britain.

### FRENCH INDO-CHINA

French Indo-China comprises the small colony of Coehin China, and a number of states which are under French protection. The whole territory falls into three parts:

(a) The rich rice-growing lands of Cambodia and Coehin China, forming an extension of the alluvial plain of Siam. This lowland region is the hinterland of the port of Saigon. This is one of the great rice lands of the world, and more than half the total crop is exported. Rice forms

<sup>1</sup> Menam = THE river; strictly the Menam Chao Phaya or River Chao Phaya.

three-quarters of the total exports of French Indo-China. The rice is milled in the busy city of Cholon and exported from Saigon, 5 miles away. Notice that the Mekong runs through the great plain : but Saigon is *not* on the Mekong. Compare this with Rangoon, which is *not* on the Irrawaddy ; Calcutta, which is *not* on the Ganges : and Karachi, which is *not* on the Indus—all of them on smaller rivers near the main one. In the centre of Cambodia is a huge lake, full of fish. Fishing is an important industry, fish forming the second article of export.

*Pnom-Penh* is the chief town of Cambodia.

(b) The mountainous region of Annam, producing cinnamon, sugar, and tea, but of much less importance. Hué is the principal town, and Tourane the port.

(c) The Tonking Region, or hinterland of the port of Haiphong. This is another rice-growing area formed by the delta of the Red River. It has rich mines of coal, tin and zinc, as well as enormous limestone quarries, portland cement being made from the limestone. Much raw silk is also produced.

Hanoi, the capital of French Indo-China, is in this region.

The people of French Indo-China are mainly Annamites, with many Chinese.

## MALAYA

The southern portion of the Malay Peninsula is under British control. It includes firstly the Straits Settlements, i.e. the old trading centres of Singapore, Penang, and Malacca. Malacca was occupied as long ago as 1511 by the Portuguese. Singapore was important in the fourteenth century until destroyed by the Javanese in 1377. Included under the Government of the Straits Settlements are the Cocos Islands, Christmas Island, and the Island of Labuan,

off Borneo. But secondly, the Malay Peninsula includes the Federated Malay States (occupying the largest area), consisting of a group of native states under British protection. Thirdly, there are some native states not under the Federation.

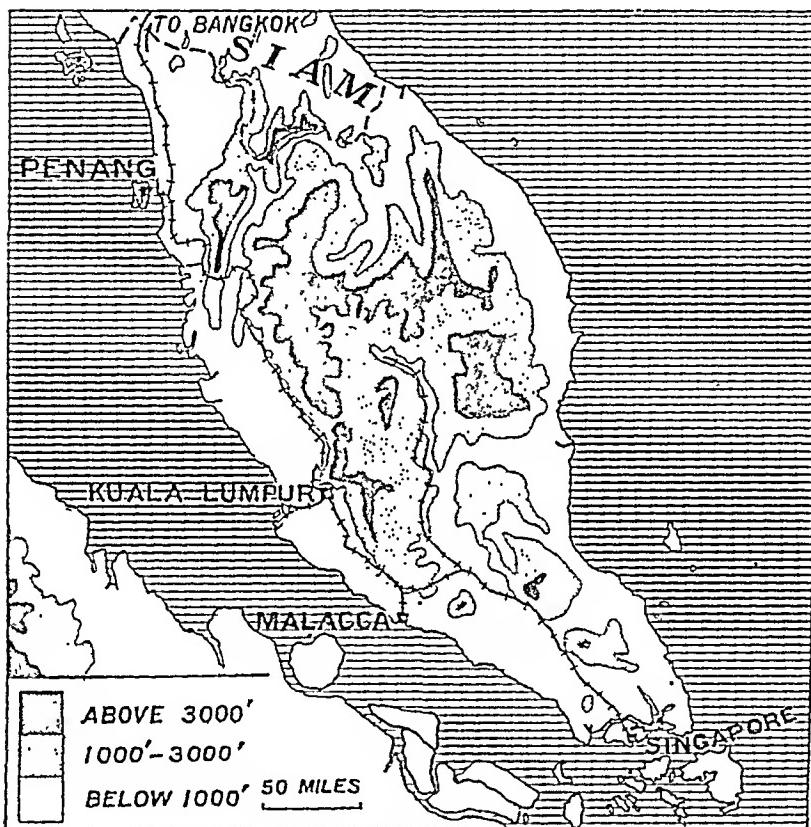


FIG. 219.—Map of Malaya.

Malaya has a backbone of high mountains, with several parallel ranges on either side. The western side is more developed than the eastern, for it is there that vast quantities of tin ore are found in the valleys. Malaya produces more than one-third of the world's supply of tin.

Malaya lies in the equatorial region, and all the hilly parts were covered with equatorial forests. About twenty years ago it was found that the climate was very suitable to the growth of the rubber tree, and now enormous areas of the country are covered by rubber plantations, and Malaya produces more than half of the world's supply. There are also many coconut plantations, and copra is exported. The chief food grain of the people is rice, but not sufficient is grown for the people's needs, and much has to be imported.

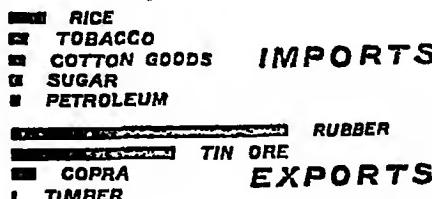


FIG. 220.—The trade of the F.M.S.  
Principal articles.

Tin and rubber have made the Straits Settlements and Federated Malay States very rich. Fine motor roads have been built all over the country, and a railway runs through the length of the country from north to south and connects with the Siamese railways. The natives—the Malays—are Mahomedans, but much of the trade of the country is in the hands of Chinamen. There are also many Indians.

The principal town of the Federated Malay States is *Kuala Lumpur*. The Federated Malay States have no good port, and most of the trade passes through Penang and Singapore.

It is curious that the two principal ports of the Malay Peninsula—Singapore and Penang—are both on islands. The sheltered harbour of Penang lies between Penang Island and the mainland. Singapore Island is now connected with the mainland by a railway and a road, and its harbour is on the south of the island.

Much of the rubber produced in the Federated Malay States is exported through Penang, but the trade of Singapore is twice as great.

*Singapore* is just like a huge market. Products from the surrounding countries are brought there and sold to merchants. The merchants then sell the produce again and send it to all parts of the world. So we find Singapore exports the same things as it imports. There are works where tin ore from Burma and the Federated Malay States



FIG. 221.—The trade of Singapore and Penang.  
Principal articles.

Figs. 220 and 221 are drawn on the same scale as Fig. 206 so that you can compare the trade of India and Malaya at a glance.

is smelted into tin, but in most cases the various products which come to Singapore are sent away again without going through any process of manufacture. Singapore imports rice to feed its people and clothes to clothe them. There are nearly half a million people in Singapore, which is one of the world's great ports. Look at Fig. 221, where the exports and imports of Singapore are compared. On a map of the world study carefully the position of Singapore in relation to world trade routes.

The famous old spice port of *Malacca*, on the mainland of the peninsula, is now little used.

## THE EAST INDIES

The East Indies are a large group of islands lying along the equator and between Asia and Australia. Except the north of Borneo, nearly the whole of the East Indies belongs to the Netherlands. Just as the Indian Government has grown gradually out of the East India Company, so the present administration of the Dutch East Indies has grown out of the Dutch East India Company, founded in 1602. The largest islands are Borneo and Sumatra, but the most important is Java. Other important islands are Celebes and the Moluccas. The island of Java, less than half the size of the United Provinces, has 30 million people. The native Javanese are Mahomedans, but there are many European and Chinese merchants. The staple food grains of the people are rice and maize, but the crops grown for export are sugar-cane, coffee, rubber, coconuts, cinchona, tobacco, and manioc (from which tapioca is made). Java supplies India with most of the sugar she requires.

There are important oilfields in Java and Sumatra, also some coal mines and some tin mines.

Although Java is such a small island the export trade is more valuable than that of Calcutta. The principal town and port is Batavia. Other ports in Java are Sourabaya and Samarang. The other islands are still largely undeveloped and partly covered with thick equatorial forest; the interior of Borneo, the second largest island in the world, is scarcely explored.

The northern part of Borneo is under British protection, and is divided into North Borneo, Brunei, Labuan. Coal exists, and there are oilfields, so the country is likely to develop; but at present the forests are the most valuable possession of the island.

The Philippine Islands lie to the north-east of Borneo, and belong to the United States. They lie outside

the equatorial rain belt, and feel the influence of the monsoons. There are about 10,000,000 people in the

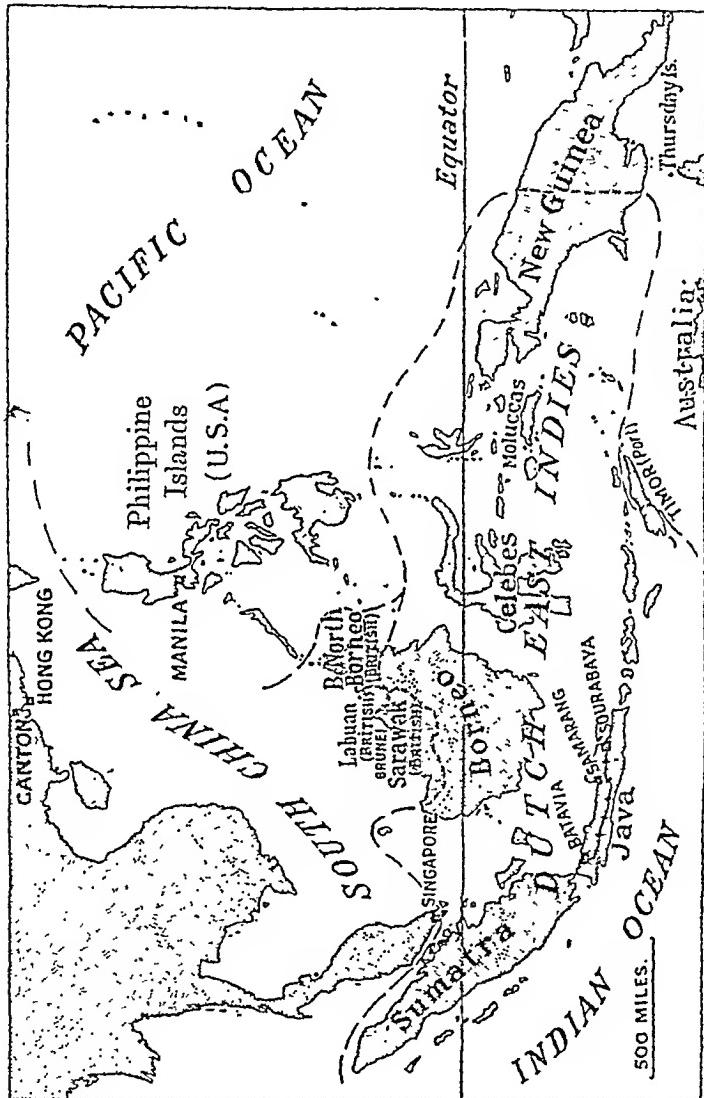


FIG. 222.—The East Indies.

islands, mostly Philippinos, and nearly all Christians. About one-eighth of the area of the islands is cultivated, the principal crops are rice, manila hemp, coconuts, maize,

sugar-cane, tobacco, and bananas. The Philippine Islands are amongst the foremost producers of copra and coconut oil in the world, whilst sugar, manila hemp, and tobacco are valuable exports.

The islands do not grow sufficient rice to feed the people, and more is imported. The other imports are manufactured goods.

The principal town and port is *Manila*.

## THE CHINESE REPUBLIC

In 1912 one of the world's oldest empires—the Empire of China—became a republic. The old Chinese Empire includes the rich, thickly populated region of China Proper, together with the huge but less important "outer territories" of Manchuria, Tibet, and Mongolia; the last two largely desert. Nominally the present republic covers the same area, but the central government is not yet strong enough to control the whole, and many states of China are acting on their own, and for some years the country has been in a state of civil war. Many hundreds of years ago the Chinese built the Great Wall of China to protect themselves from raiders from Mongolia. This wall still marks roughly the northern limit of China Proper. We will consider China Proper first.

### CHINA PROPER

**Position and Size.**—China is about the same size as India, and has roughly the same number of people. But it is almost entirely outside the Tropics.

**Physical Features.**—To the west of China lie the high plateaux of Central Asia. The plateaux of Yunnan fade away gradually into the mountainous region of Southern China, whilst farther north the Plateau of Tibet

sends out fingers of mountains eastwards. Two of these fingers enclose the famous and important "Red Basin" through which the Yangtze flows. The whole of China may be described as mountainous except for the Great

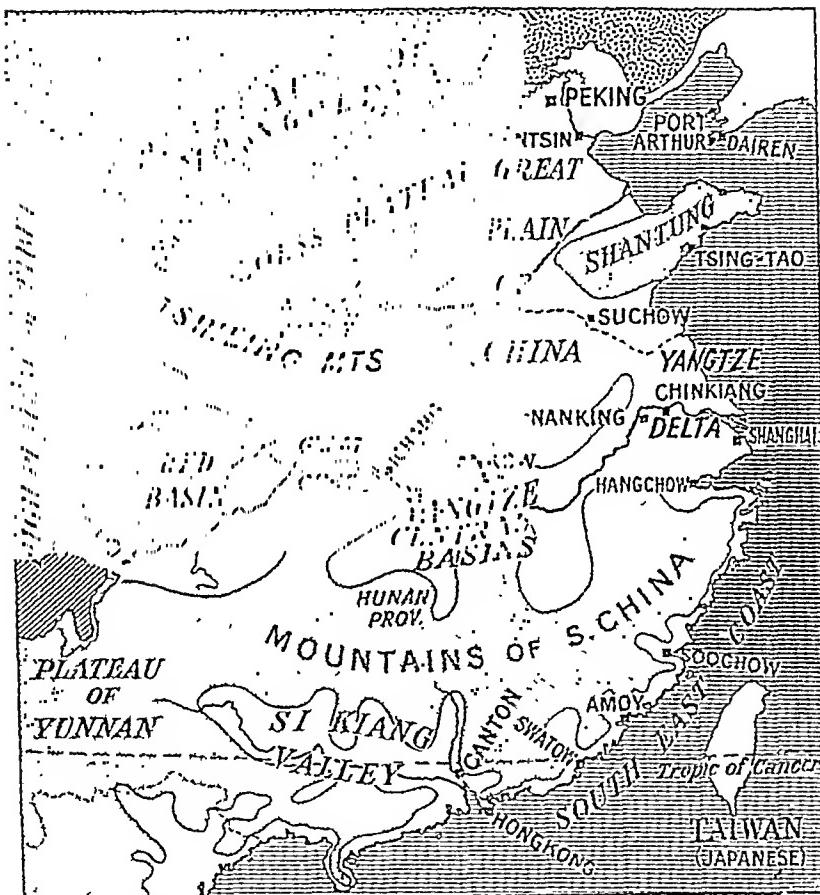


FIG. 223.—Diagrammatic map of China. Showing roughly the main river valleys and plains.

Plain of China, in the north-east, and the plains of the Yangtze. The Hwang Ho, called China's Sorrow because of its disastrous floods, used to find its way to the sea south of the mountainous Shan-tung Peninsula, but in 1852 suddenly changed its course, and now enters the sea north

of the peninsula. Notice how this great river plain is overlooked by the plateau.

The two great rivers of China are the Hwang Ho and the Yangtze. Both are navigable for great distances, and afford two of the most important highways of trade. In the south the Si Kiang, or West River, is of great importance. Many other smaller rivers are navigable, and there are numerous canals. Note that the Chinese word "kiang" means river.

**Climate.**—China is not shut off from the interior of Asia by any great chain of mountains. Consequently, when the interior of Asia gets very cold in the Cold Season, China gets very cold too, and suffers icy winds from the cold interior. In January the northern half of China is below freezing. The winds are not only very cold but very strong, and bring great dust clouds from the dry desert regions. The greater part of Northern China is covered with a great mantle of this dust or loess. By May, the interior of Asia has become warm and the monsoon commences to blow. It blows from the south or south-east, but is not so strong as in India. It is this wind which brings the rain. China has then a monsoon climate like that of India, but is different, because the winters are very cold. The rainfall is heavier in the south than in the north; the south is also warmer.

**Vegetation and Crops.**—Although China, like India, has monsoon rains, it is very much colder in the cold season, and natural vegetation is different. The hills are clothed with a forest of mixed evergreen and deciduous trees, but there are large areas of barren, deforested land on the hillsides. Like India, China is essentially an agricultural country. Generally the crops are very mixed, and the clever Chinaman has practised "rotation of crops" and intensive cultivation for long ages. Except in the north, over the Hwang Ho plains, there are no very large areas of flat land. Yet the population is as large as that of India. Therefore the Chinese farmer has to cultivate his land very carefully. Each farmer grows several grains

as well as fruit trees, and probably grows a little tea ; and keeps pigs as well as silkworms. Irrigation is often necessary, especially in the loess areas of the north. In the north the chief food crops are wheat, barley, millet, peas, and beans ; in the south rice and sugar are most important. But China grows scarcely enough food for her people, and sometimes famines occur. Cotton is an important crop, especially in the Yangtze Kiang Valley ; whilst tea is grown in the south and west. Pigs are reared



[Photo : L. D. Stamp.

FIG. 224.—A Chinese joss house, Bhamo.

The architecture, with the curved roof, is very characteristic.

everywhere, and fat pork is a favourite food of the Chinese. There are also large numbers of sheep. Silk culture is one of the most successful industries in China, and China supplies a quarter of the world's total.

China has not yet advanced in the same way that Japan has done. The industrial revolution has only begun. There are now large cotton and wool mills and silk factories in Shanghai, Canton, and other large centres, as well as flour mills. But the interior is less forward. Progress is

hindered by civil war, weak government, and the absence of a proper system of money, weights, and measures.

**Minerals.**—One day China may become a leading nation in the production of minerals. There are rich coalfields, but at present the production is less than that of India. The iron deposits in Shansi are amongst the largest in the world. Those of Tayeh, near Hankow, are among the richest in the world. There are rich copper deposits in Yunnan, and much tin ore is produced north of Canton and in Yunnan. The tin ore is exported from Hong Kong. Hunan produces half the world's supply of antimony. Gold and silver are also mined.

**Population.**—The distribution of people may be compared with that in India. Population is densest in the Great Plain (Hwang Ho), the Yangtze Basin, and the coast lands, and least in the mountainous regions. The total number of people is roughly the same as in India. The Chinese are mostly Buddhists or Confucians. The language varies from one part to another, but efforts are being made to standardise it.

**Natural Regions.**—We do not know enough of China to divide it accurately into natural regions, but the three great river basins are the most important regions.

- (1) The Lower Valley of the Hwang Ho, or the Great Plain, and the Loess Plateau of the North-West.
- (2) The Shantung Peninsula.
- (3) The Central Basins and Delta of the Yangtze.
- (4) The Upper Valley of the Yangtze (Red Basin).
- (5) The Valley of the Si Kiang, or West River.
- (6) The South-Eastern Coast.
- (7) The Mountainous West.

The Great Plain of Northern China and the Loess Plateau of the North-West have warm summers and very cold winters, and rather a poor rainfall. Wheat, peas, beans, and millet are the staple crops. Ground-nuts thrive on the poor, sandy soils. In the extreme north is Peking, until recently the capital; but the trade centre is the port of Tientsin, on the navigable Pei Ho. From this

port routes radiate to all parts of China. *Suchow*, farther south, is near the old bed of the Hwang Ho, which the river occupied until 1852.

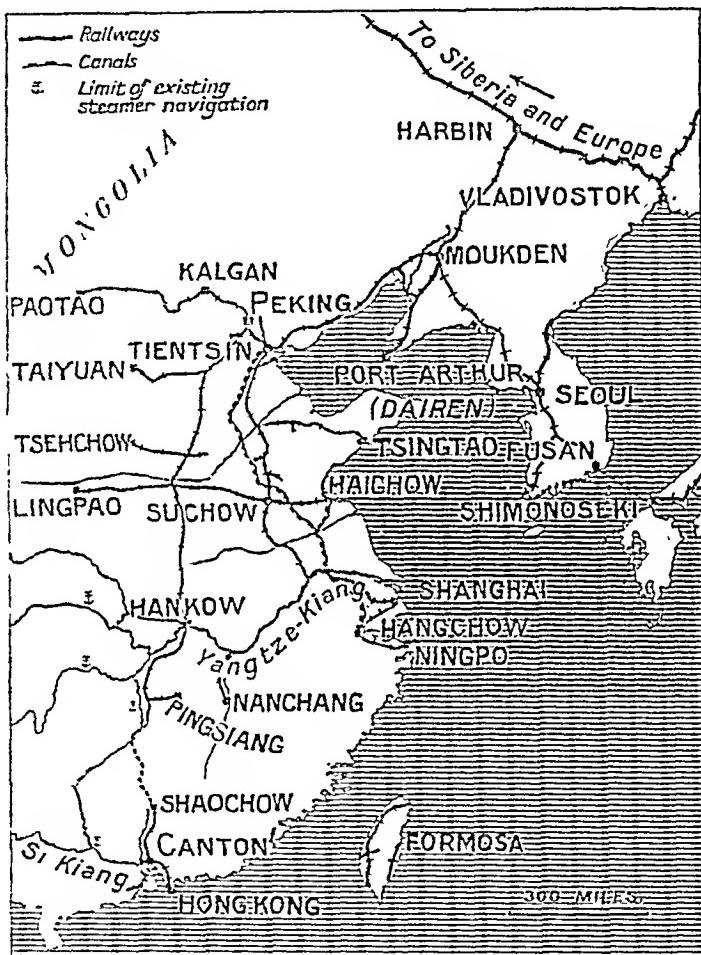


FIG. 225.—The communications of China.

Notice especially the few railways and the difficulty of travelling from north to south in China. The thin lines are railways; navigable rivers and the Imperial Canal are also shown.

The Shantung Peninsula is a hilly region of old hard rocks, lying between the old and new mouths of the Hwang Ho. It is the most important of the silk-

producing regions of China, the silkworms living on the oak trees of the hills. *Chefoo* and *Tsingtao* are the two ports.

The Central Basins and Delta of the Yangtze have warmer winters and warmer summers, and a greater rainfall. This is the most fertile and densely populated part of China. Wheat and rice are staple food crops; much cotton is grown. Tea is another crop of importance, and silk is produced towards the south. This region extends as far as the great gorge of the Yangtze. Near the mouth of the Yangtze lies *Shanghai*, the greatest port and one of the largest cities of China. The other towns of the region are mostly river ports, which collect and send away the products of the surrounding region. The principal are *I-chang*, *Hankow*, *Nanking* (the present capital), *Chinkiang*, and *Hangchow*. *Hankow* is probably the largest town in China. The river is the great highway.

The Red Basin, or Upper Valley of the Yangtze, lies above the great gorge. It forms the province of Szechwan, and is one of the great silk regions of China.

The Valley of the Si Kiang has a climate rather like that of the Ganges Valley—warm winters and hot summers and a plentiful rainfall. Rice is everywhere the staple crop, but the valley is smaller and narrower than the others. Near the mouth of the river is *Canton*, the great outlet of Southern China, and the British port of *Hong Kong*.

The South-East Coast is mountainous, but the narrow valleys are sheltered from the cold winter winds. Tea, silk, and cotton are produced. The principal ports are *Foochow*, *Amoy*, and *Sicatow*.

The Mountainous West.—Many of the valuable minerals come from the mountainous west, and there are vast deposits still untouched.

Communications in China.—The rivers are still the great highways of trade, and more railways are badly needed. Peking is the centre of the railway system, but is not yet linked up with Southern China. Study the

railway map carefully. The railways in China are due mainly to Japanese, British, and Russian activity.

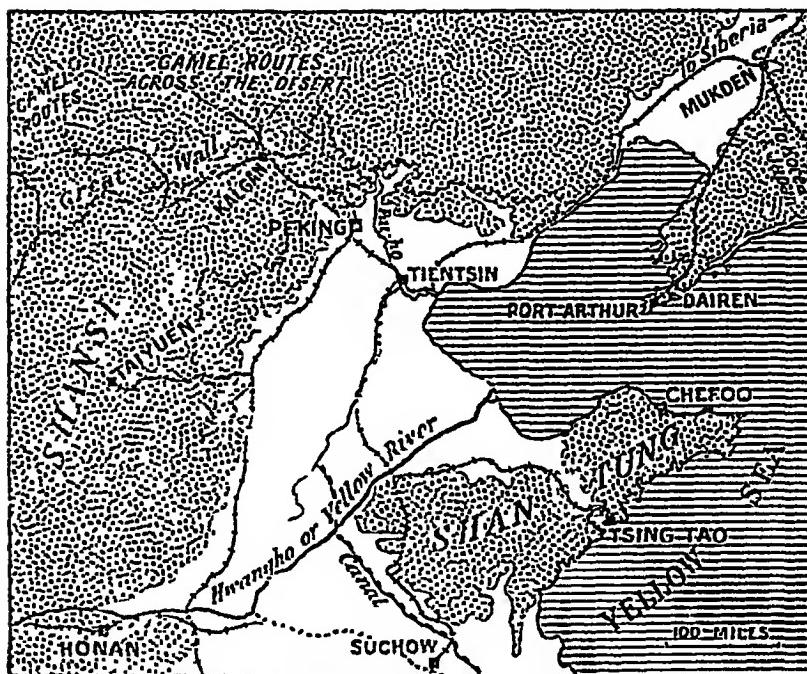


FIG. 226.—The position of Peking.

All land over 600 feet is dotted. Notice the old course of the Hwangho River.

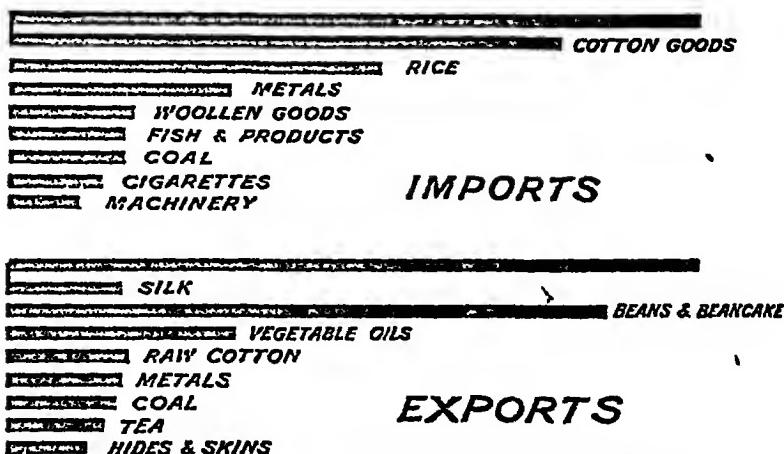


FIG. 227.—The trade of China. Principal articles, 1926.

This diagram is on the same scale as the similar ones for India, Japan, Singapore, and F.M.S.

The Trade of China.—The diagram shows the principal articles of import and export. The diagram is drawn on the same scale as the ones for Singapore and Japan. Although China is such a large country, it has not a very large foreign trade. Until about fifty years ago China would have nothing to do with foreigners, and even now only certain ports are open to foreign ships. So we find the trade of China is only about two-thirds of the trade of India, and much less than that of the much smaller country of Japan.)

#### CHINESE OUTER TERRITORIES

Mongolia is a vast area in the centre of Asia, larger than the Indian Empire, but with fewer people than the city of Bombay. It consists mainly of the great desert of Gobi or Shamo. It stretches from the mountains on the frontier of Siberia to China. The people are nomads, wandering about with their flocks of camels, horses, and sheep. Much of the land is fertile and only irrigation is required to make it productive. Settlers from China are commencing to cultivate some of the border tracts near China. Some parts are known to be rich in minerals. The principal trading centre is *Urga*, which is now reached by motor-cars from *Kalgan*.

Tibet occupies the great plateau of Tibet, the bleak, barren region which has already been mentioned under India. About 2,000,000 people are believed to live in the region ; they are divided into Lamas, or monks, and the lay people. The head of government is the Dalai-Lama, who lives at *Lhasa*. For a very long time foreigners have been prevented from entering the country, and large parts are still unexplored. Within recent years, much of the country has been opened to British trade.

North of Tibet lies the province of Sin-kiang, including Chinese Turkestan. The two principal towns are *Kashgar* and *Yarkand*. About these two towns the land is irrigated and the country is increasing in prosperity.

**MANCHUKUO or MANCHURIA**

Manchuria is a large territory, three times the size of the whole of the British Isles, that lies to the north of China and Korea. In the Middle Ages the country was inhabited by wandering tribes of Manchus. Some of these Manchus were very fierce and warlike, and they conquered the whole of China. Making their capital at Peking, the Manchu dynasty ruled the Chinese Empire for many hundreds of years until the Empire came to an end in 1912. Thus it was that Manchuria, the land of the conquerors, became united with China Proper. But there is no longer a Manchu population in Manchuria. A few scattered communities alone remain. The 25,000,000 people in the country are mainly Chinese, with a few Japanese; and so the Chinese claim Manchuria as part of China. But the wonderful progress which Manchuria has made in recent years has been done almost entirely with the help of the Japanese and with Japanese money. The people of the small, crowded and mountainous islands of Japan would starve if they could not get food supplies from abroad, and it is the food supplies from Manchuria that Japan needs very badly, together with coal, iron and other minerals. So, with the help of the Japanese, Manchuria has declared itself an independent country under the name of Manchukuo.

Manchukuo consists of the three provinces of Fengtien, with its capital at Moukden, Kirin, with its capital at Kirin, and Heilungchiang, or the Amur Province, with its capital at Tsitsihar. But geographically Manchuria should really be divided into three regions—the eastern and western hills and the central plain. The climate of the plain is not unlike that of the Canadian prairies, with very cold winters, hot summers and a rainfall mainly in the early summer. There is still plenty of room for more people and there are vast opportunities for development, and Manchuria is rapidly becoming one of the world's great granaries. Millet and wheat are the great food crops,

together with beans, the latter grown largely for export. Perhaps we cannot realise how important the beans—soya beans—can be; but they yield a valuable oil which can be used in cooking and in the manufacture of soaps, margarine, and a very large variety of foodstuffs, whilst the beans from which the oil has been crushed out give a valuable cattle cake. So bean cakes, beans and bean oil form more than half of all the exports of Manchuria. The other products exported are wheat, other cereals, coal and timber, about two-thirds of all the exports going to Japan. Every year large numbers of Chinese immigrants arrive in Manchuria from the over-populated parts of China. Although the Japanese have spent much money in developing the country, by building railways, roads, hospitals, towns, working mines, etc., there are not many Japanese settlers because the Japanese do not like the hard climatic conditions. Japan needs the food and raw materials which Manchuria can supply. The Japanese built and own the South Manchuria Railway, which has done for Manchuria largely what the Canadian Pacific Railway did for Canada in opening up the country. | There are other railways, and altogether the length of lines is one and a half times that in the whole of the British Isles, so it is wrong to think of Manchuria as a wild undeveloped country. | The South Manchuria Railway runs into the Kwang-tung Peninsula, which, with the ports of Port Arthur and Dairen, belongs to Japan. The most important inland town is Moukden, whilst Harbin lies farther north on the Chinese Eastern Railway, as the portion of the Trans-Siberian Railway passing through Manchuria is called.

#### HONG KONG

Near the mouth of the Canton, or West River, lies the small island of Hong Kong, which has been a British Possession since 1841. The island is separated from the mainland by a strait only half a mile wide, and on the shore of the mainland is Kowloon, part of the colony. A

considerable piece of the mainland has also been leased to Great Britain. The strait between the island and the mainland forms a wonderful harbour, and Hong Kong is visited by 50,000 vessels yearly. Hong Kong is a free port, there are no customs duties, and much

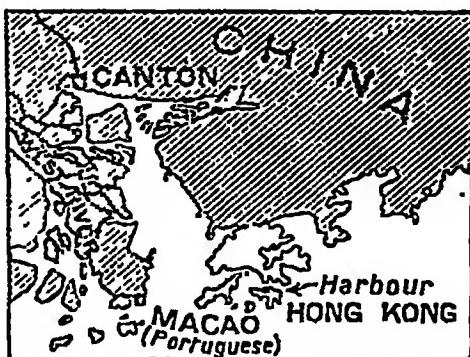


FIG. 228.—The position of Hong Kong.

of the trade of South China passes through Hong Kong. The trade of Hong Kong is greater than that of either Bombay or Calcutta. The rich Chinese merchants are safer there under British rule than in China, and more than 820,000 Chinese live on the island or in Kowloon. There are also shipbuilding yards, sugar factories, etc.

## THE JAPANESE EMPIRE (NIPPON)

The island kingdom of Japan has often been called the "Britain of the East." Both Britain and Japan are groups of islands in temperate regions, lying one to the north-west and the other to the north-east of the great land mass of Eurasia. Japan Proper consists of four large islands forming a long curve from north-east to south-west. But included in the Japanese Empire are half the island of Sakhalin in the north, a string of small islands terminating with the large island of Taiwan in the south, and the large Peninsula of Korea on the mainland of Asia. The Emperor is called the Mikado.

**Position and Size.**—Japan Proper extends from 30° N. to 45° N., but running through the island of Taiwan (Formosa) is the Tropic of Cancer, whilst Japanese territory in Sakhalin extends to 50° N. The Japanese Empire thus covers a wide latitude, but the whole is nearer the equator than are the British Isles; 135° E. runs through the centre of the kingdom. The largest island of Japan (Mainland, or Honshu) is almost exactly the same size as the largest island (Great Britain) of the British Isles, but Japan Proper is larger than the British Isles, and the Japanese Empire is more than twice as large as the British Isles. But the whole empire is only a little larger than Burmá, or less than Bombay and Madras together.

**Physical Features.**—Nearly all parts of the Japanese Empire are mountainous, but the mountains are irregularly arranged. There are numerous volcanoes, of which the most famous is Fuji Yama (Mount Fuji), over 12,000 feet high. It is a sacred mountain to the Japanese. Many other peaks rise to over 7000 feet. Compare this with Great Britain, where the highest mountain is 4400 feet. The only extensive plain is around Tokio. The four main islands of Japan are Hokkaido in the north, Mainland or Honshu (the largest), Shikoku, and Kyushu. Notice care-

fully the position of Shikoku and Kyushu. Between them and Honshu is the famous Inland Sea of Japan, which is like a huge sheltered harbour, very beautiful and very

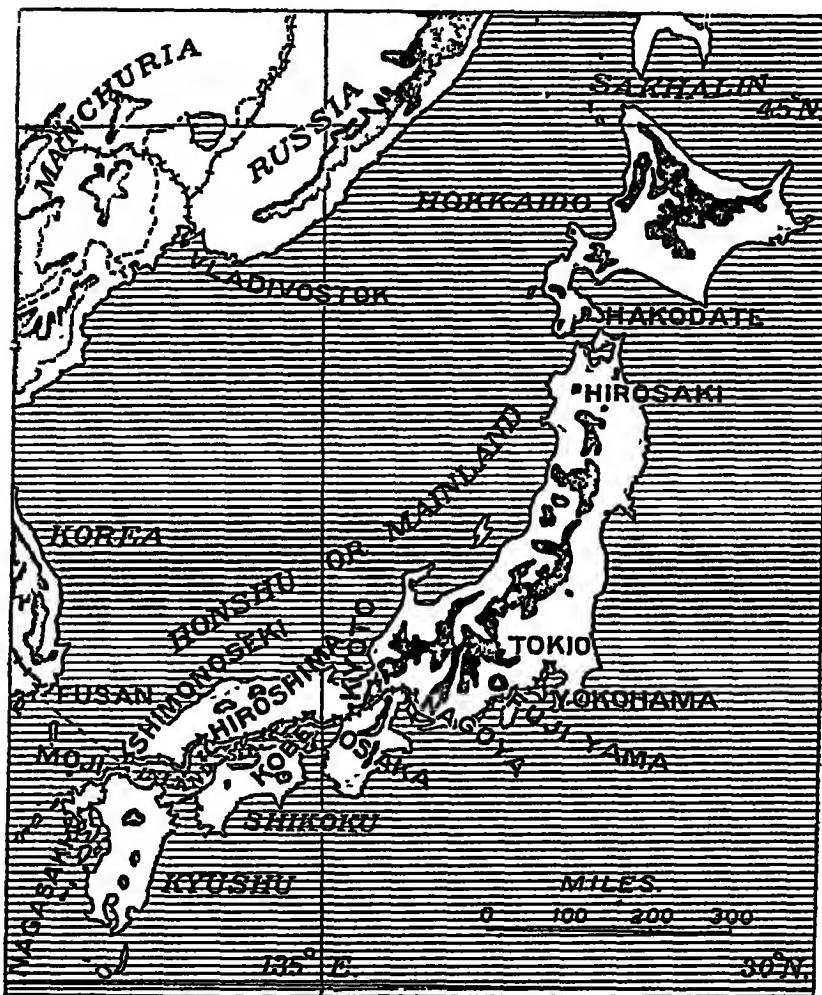


FIG. 229.—Map of Japan.

valuable to shipping. Japan suffers very badly from earthquakes. In September, 1923, one of the most disastrous earthquakes in the history of the world entirely

destroyed the great port of Yokohama and a great part of the capital, Tokio.

**Climate.**—The climate of Japan is greatly affected by ocean currents (see Fig. 110). Notice how the warm Kuro Siwo, or Japan Current, splits into two branches, one on each side of Japan. Then there are two cold currents also. Notice why the west coast is a little warmer than the east. Japan is often compared with the British Isles as regards climate, but in many ways it is more like Newfoundland. In the cold season the northern half of Japan is below freezing—much colder than Scotland, but in the hot season (July) Southern Japan is as hot as the west coast of India. The extremes are much less than in China, because of the influence of the sea all round, but there is certainly a big variation. The north-western side of the islands gets most of its moisture in the cold season, when winds are blowing across the sea from the mainland of Asia. Snow is more important than rain. But the south-eastern side gets a heavier rainfall in the warm season when the monsoon is blowing. The monsoon in Japan blows from the south-east, and is part of the Great Monsoon System of Asia. But the winds are not nearly as strong as the South-West Monsoon winds in most parts of India.

**Vegetation and Crops.**—Japan is a mountainous country, and the hilly parts, which cannot be used for cultivation, are usually forested. In the north the forests are of coniferous trees usually mixed with some deciduous; in the south broad-leaved trees are more abundant. The forests are a valuable source of soft timber and are carefully looked after. They cover nearly half of Japan. But 60,000,000 people (600 lakhs) live in Japan, and every available piece of land is used for crops. Often villages are built on steep hillsides and the hill is cut into little tiny fields. Three-quarters of the arable land is cultivated by peasants. Moreover, intensive cultivation is practised. The principal food grain is rice, which can be grown all over the south because of the high summer temperature. Wheat, barley, and rye (rye in the cold north) together

cover as much ground as rice. The other important crops are tea and tobacco. Japanese tea is different from that of India or Ceylon. Most of the tea is exported to the United States; it is not liked very much in other parts of the world. A considerable number of cattle are kept, but Japan is so carefully cultivated that there is little land left for sheep or goats. Large numbers of mulberry trees are grown for the sake of the silkworms, for the production of silk is a very important industry. The silkworms are reared by the same farmer who farms wheat, an interesting example of mixed farming. Japan produces 60 per cent. of the silk of the world.

**Population.**—The Japanese are the most progressive and probably the cleverest of all the Mongolian races. They have adopted and often improved all the great inventions of western nations. They have become a first-class power, with the third largest navy in the world, and all the men who are physically fit are trained either in the army or navy.

The indented character of the coast-line has had the same effect as in England. The Japanese are a seafaring people, and have large numbers of merchant ships. The Japanese are either Shintoists or Buddhists by religion. The Japanese have, of recent years, become an industrial nation and are busily engaged in manufactures of all kinds. There are many large industrial cities, quite like the manufacturing towns of Europe or America, and very different from the quaint old country towns and villages.

**Mining.**—Japan has several coalfields, and produces considerably more coal than the whole of India, but only about one-tenth of that mined in Great Britain. The coalfields are in Kyushu, near Nagasaki, and in Hokkaido. Notice that the coalfields are in the northern island and the southern island of Japan Proper. Japan also has oilfields near the north-west coast of Honshu, but does not produce enough for her own use—only about one-fifth of the quantity produced in Burma. There are valuable copper deposits, but less important are gold, silver, iron, and sulphur. Japan is poor in iron ores.

Fishing is an important occupation of the Japanese, and they have invented a wonderful process whereby oysters are made to form natural pearls, and large numbers of these "culture pearls" are obtained.

**Manufactures and Trade.**—The principal industries are the manufacture of cotton, silk, and woollen goods, paper, earthenware and glass and matches. Japan is noted for cheap cotton and silk goods, as well as cheap toys, matches, etc., but the quality is often below that of other countries. The industrial revolution in Japan

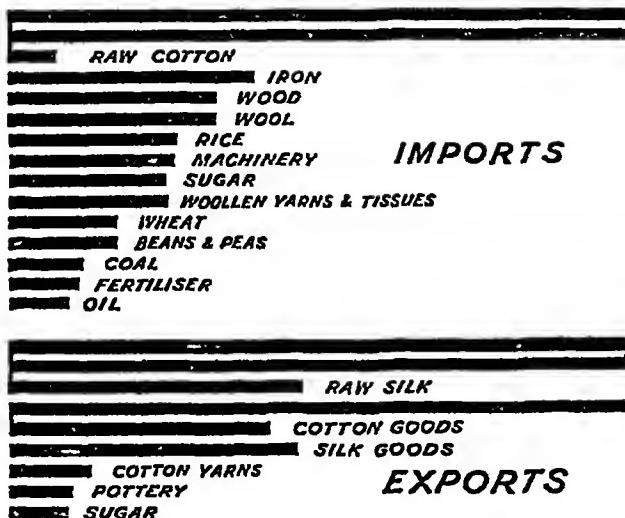


FIG. 230.—The trade of Japan. Principal articles, 1927.

Compare this diagram very carefully with the ones for China and India. Notice that Japan exports both raw materials and manufactured goods, but imports mainly raw materials.

occurred mainly after the China-Japan War of 1894-5. The growth of factories has been extremely rapid, especially during the Great War. The Japanese standard of life is much lower than that of the industrial nations of western Europe and North America, and so, as they work for lower wages, they can export their goods very cheaply indeed. Just like Great Britain, Japan has to import much of the raw material for her industries—especially cotton (from U.S.A. and India), wool, and iron. Japan has not nearly

enough iron, and so imports iron and machinery. She cannot grow enough food for her people, and so buys rice, as well as peas, beans, and sugar. By far the most valuable export is raw silk and silk goods, followed by cotton goods, glassware and earthenware, tea, matches and timber, and refined sugar. Japan exports coal from Nagasaki and Hakodate, but imports it at other ports.

**Cities.**—*Tokio*, the capital, is one of the world's greatest cities, with  $2\frac{1}{2}$  million people. It was partly destroyed by the earthquake in 1923. It is a busy manufacturing centre.

*Osaka* is the principal manufacturing city of Japan, and is also a port.

*Kyoto* is the old capital of Japan, and a fine historic city. It has, however, moved with the times and developed numerous manufactures.

*Yokohama* is the largest port of Japan; it is not only the port of Tokio, but has large manufactures of its own. It was entirely destroyed by the earthquake and fire of 1923, and most of the merchants moved to Kobe or Osaka. They are gradually returning and the city is commencing to regain its old importance.

*Kobe* is the second port of Japan. Kobe is close to Osaka, and the whole forms one great manufacturing district.

*Nagoya* is an inland centre.

*Nagasaki* is a coal port, and an important naval station and the principal town on Kyushu.

*Hiroshima* is a large port on the Inland Sea, whilst *Moji* and *Shimonoseki* are twin ports at the western entrance to the Inland Sea. They are to be connected by a railway tunnel under the straits. It is from here that boats go across to Korea.

*Hakodate* is the principal town and port of Hokkaido.

**Railways.**—Japan is well served by railways. One of the most important lines runs through the country and connects the principal towns—from Shimonoseki to Hiroshima, Kobe, Osaka, Kyoto, Nagoya, Yokohama and Tokio. The direction of many of the railways is controlled by the mountainous nature of the country.

## KOREA, OR CHOSEN

is a large mountainous peninsula. After the war between China and Japan in 1894, it became independent. In 1910 it was annexed to the Japanese Empire, in order that it might not be seized by Russia. The inhabitants, Koreans, number 18,000,000. Korea is an agricultural country and grows more rice, barley, peas, and beans than the people need, and so is very useful to Japan, who needs these foods. Korea is rich in minerals, including iron, which is so badly needed by Japan. The country is still largely undeveloped. The principal town is *Seoul*: whilst the port of *Fusan* is only about 120 miles from Shimonoseki, in Japan.

## TAIWAN

became part of the Japanese Empire after the China-Japan War, in 1895. It is being carefully developed by Japan; mining and agriculture are steadily progressing. It produces and exports camphor, tea, sugar, and coal. The island is roughly half the size of Ceylon.

## PORT ARTHUR (DAIREN)

is held by Japan from China for 99 years. Notice its important position.

## SIBERIA AND RUSSIAN TURKESTAN

Very roughly Siberia covers the same area as the lowland triangle of North-Western Asia. We have learnt that this is a great lowland area, drained mainly by the Ob, Yenesei, and Lena Rivers, which flow into the Arctic Ocean. The mouths of these rivers are frozen for a great part of the year, even during the time that their middle courses farther south are not frozen. As a result, the water cannot

get out at the mouths and spreads over large areas, forming an enormous marsh. In the north is the Tundra, a frozen waste for part of the year, and a great marsh for the other.

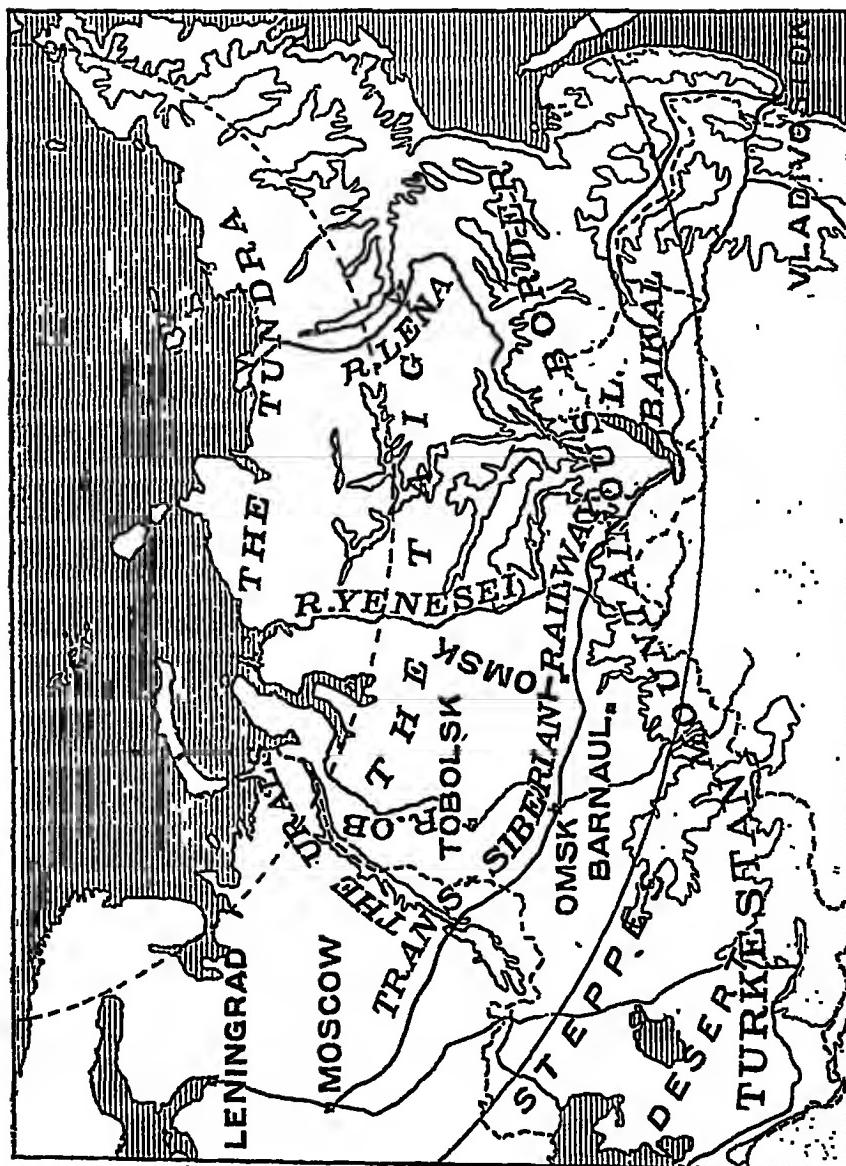


FIG. 231.—Map of Siberia and Russian Turkestan.

South of the broad belt of the useless Tundra lies the belt of Coniferous Forests—the Taiga, which in places is very marshy. To the east the forest belt stretches to the foot of the mountains of Mongolia, but to the south-west the forest passes gradually into grassland. The belt of grassland with scattered trees is the most fertile part of Siberia. The soil is rich like the “black earth” of Russia, and large quantities of wheat are grown. Farther south the land gets drier and passes into steppe—poor grassland—and gradually into desert.

These, then, are the natural regions of Siberia :

- (1) The Tundra.
- (2) The Taiga, or Coniferous Forest Belt.
- (3) The Fertile Savannah land.
- (4) The Steppe.
- (5) The Desert.
- (6) The Mountainous Border.

All over Siberia the rainfall is low—never more than 20 inches. The parts of India which have less than 20 inches of rainfall are practically desert, but you must remember in colder countries like Siberia crops will grow with less rain, because the sun does not dry up the ground so quickly.

- (1) The Tundra is an almost uninhabited waste.
- (2) The Taiga is little used ; in parts the trees would give fine timber, but in the marshy parts the trees are rotten. The chief industry in this region is fishing.
- (3) The Savannah, or Rich Steppe with trees, has most of the people of Siberia, and is the most developed region ; as well as wheat cultivation, large numbers of cattle are reared, and the manufacture of butter is important, especially in the rich valleys near Kurgan, Omsk, and Barnaul.
- (4) The Steppe is still undeveloped, and is inhabited by wandering tribes with herds of horses, camels, cattle, and sheep. There are important mineral resources not yet developed.
- (5) The Desert stretches southwards from the Steppe

land to the mountains of Persia. For a narrow strip along the foot of the mountains irrigation by means of short streams from the mountains has been carried out, and much cotton is grown.

(6) **The Mountainous Border.**—Russian Turkestan and Siberia include a strip of mountainous country where the land borders on the Chinese Empire. Mining is important, but is little developed; many of the hills between the valleys are very fertile and cattle are reared. Farther east, Siberia includes the mountainous country around Lake Baikal and the borders of the Pacific Ocean.

**Communications.**—In the north the rivers of Siberia—the Ob, Yenesei, and Lena—are navigable for great distances and important for local use, but their lower courses are frozen in the winter.

Running from east to west right across Siberia is the Trans-Siberian Railway. It runs to the south of the Coniferous forests and the marshes, and in the fertile belt around Omsk and Tomsk. From there the railway enters the mountains and skirts Lake Baikal, and runs thence to Vladivostok. Follow its course carefully on the map (Fig. 231).

In South-Western Siberia there is another important railway, running from the Caspian Sea along the foot of the Persian mountains (through the irrigated area) to the mining districts of Turkestan. Another line runs from Turkestan direct to Moscow in Europe.

## AFGHANISTAN, PERSIA, AND TURKEY

In the section dealing with the physical features of Asia, we learnt that running westwards from the Pamir Knot there were two great mountain chains, enclosing between them a series of plateaux. The countries which occupy this area of mountains and plateaux are, from east to west, Afghanistan, Persia, and Turkey. To the north

of this area of mountains are lowlands, viz. the deserts of South-Eastern Siberia, the Caspian Sea and surrounding lowlands, and the Black Sea. To the south are lowlands or seas—the Indus Valley, Persian Gulf, Mesopotamia, or the Tigris-Euphrates basin, and part of the Mediterranean Sea.

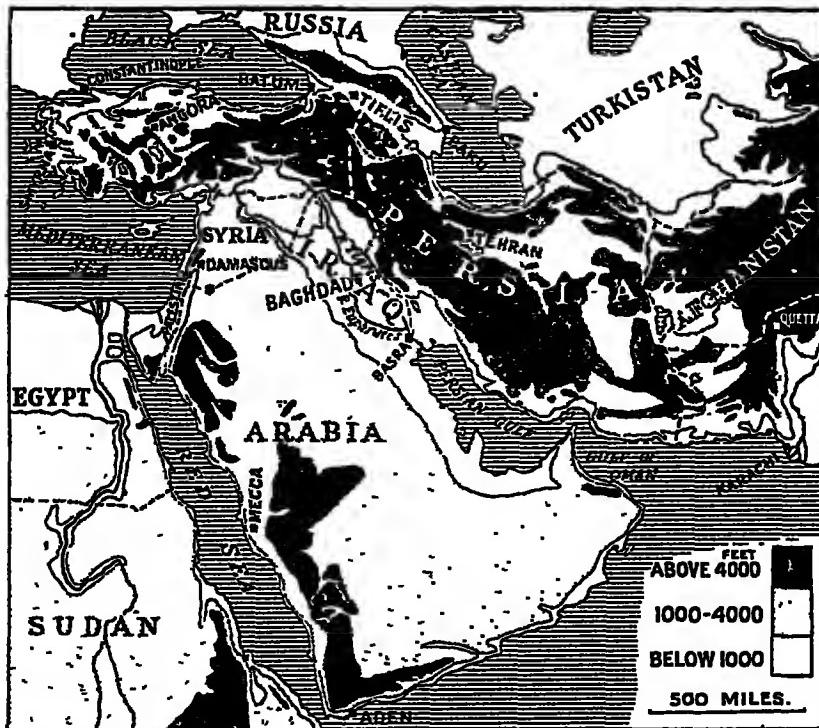


FIG. 232.—South-Western Asia.

Study the map, Fig. 232, carefully before you read any further.

#### TURKEY

Asia Minor is the only part now remaining of the once huge Turkish Empire in Asia. Turkey also possesses the territory in Europe round the old capital of Constantinople.

Notice that Turkey thus holds the key to the Black Sea. Asia Minor extends from the *Ægean* Sea on the east to the Armenian Knot in the west. It can be divided into two parts :

- (a) The Plateau.
- (b) The Coastlands.

(a) The Plateau is dry and largely covered with poor grass. The people are nomads, wandering about from place to place. Their principal occupation is keeping herds of goats and sheep, especially the famous Angora goat, from whose hair carpets are made. In the heart of the plateau lies *Angora*, now the capital of Turkey.

(b) The Coastlands border the Mediterranean Sea and the *Ægean* Sea. The soil is often fertile and the climate is Mediterranean, so that fruits such as the grape, olive, and fig are grown. Wheat, barley, and a little cotton are also produced. There is also a coastal strip along the Black Sea which is damper and largely covered with forest, from which hazel nuts are exported. On the west coast and amongst the *Ægean* Islands sponge fishing is an important industry. The principal town of Asia Minor is *Smyrna*. Remember that the mountain ranges run east to west, so that *Smyrna* on the west coast commands easy valley routes on to the plateau. *Smyrna* was largely destroyed by fire in 1922.

The knot of mountains known as the Armenian Knot is occupied by the Republic of Armenia. Between the Armenian Knot and the Caucasus Mountains lies the region known as Trans-Caucasia, and now occupied by the two republics of Georgia and Azerbaijan. *Baku*, in Azerbaijan, has some famous oilfields, and the oil is sent by railway to *Batum* on the Black Sea. Notice how this railway runs through the valley lands of Azerbaijan and Georgia. *Tiflis*, the principal town of Georgia, lies on this route.

The republics of Armenia, Georgia, and Azerbaijan were formed after the Great War, but did not remain independent for long, and now form part of the Russian Federation of Republics, described under Europe.

### PERSIA

Persia is a large country, but only has about fourteen people to the square mile, since a very great part is covered by deserts and high mountain ranges. We can divide the country into three parts :

- (a) The Northern Lowland Strip.
- (b) The Central Plateau and Mountains.
- (c) The Gulf Coast.

The Northern Lowland Strip lies along the shores of the Caspian Sea ; the rainfall is heavier than in other parts of Persia, and the soil is good. Rice, sugar, and cotton can be grown, but the strip along the coast is feverish. The slopes of the hills are forested, and the towns are built at the foot of the slopes. Above the forest, pasture land is found.

The Central Plateau and Mountains occupy most of the country. Surrounded by a ring of mountains (see Fig. 108) is a great salt desert, and any rain drains into an inland lake. The winters are cold and the summers are hot ; the little rain which does fall comes in the winter, so that Persia really has a very dry type of Mediterranean climate. Most of the inhabitants live in oases in the desert where grain, cotton, tobacco, and opium can be grown, or in the more fertile valleys amongst the mountains. In the mountains the people keep herds of sheep, goats, horses, and cattle, and wander about from place to place. The most fertile valleys, where grain can be grown, are in the north-west. The capital of Persia, *Teheran*, is in this region.

The Gulf Coast bordering the plains of Mesopotamia, Persian Gulf, and Gulf of Oman is a dry dusty region. It has recently become important owing to the development of a great oilfield. The towns along this coast, *Bushire* and *Bandar Abbas*, serve as ports for the interior.

### AFGHANISTAN

The eastern part of the Plateau of Iran belongs to Afghanistan. Most of the country is over 4000 feet high,

and many of the mountain ranges rise to 15,000 feet and more, and so the climate is cold. The capital, *Kabul*, is snow-covered for several months of the year, but the summers are hot and dry. The Afghan people are mainly nomads and their wealth lies in their flocks of sheep, goats, etc. Agriculture, where practicable, is carried on by the help of irrigation.

## MESOPOTAMIA

(Iraq is Mesopotamia with a strip of desert to the west.)

In the section on the "Physical Features of Asia" we spoke about the great river basins which separate the folded mountains of the centre of Asia from the old plateau of the south. One of these flat river basins is that of the Tigris and Euphrates, and the country covering this basin is called Mesopotamia. Just like the fertile plains of the Ganges, this is the home of some of the great civilisations of the world. The great empires of Babylonia (with its centre at Babylon on the Euphrates) and Assyria (with its centre at Nineveh on the Tigris) flourished thousands of years ago. In that distant past Mesopotamia was a land covered with crops maintained by a careful and elaborate system of irrigation. The people were rich and prosperous, and became famous as builders of great brick cities, as sculptors, and as scholars.

With the coming of Turkish rule the cities fell into decay, and the irrigation works were destroyed, leaving the country a barren waste. Since the Great War Mesopotamia has become an Arab kingdom under the influence of Great Britain, and may become of great importance in the future. This kingdom is called "Iraq," since it includes a strip of desert as well as Mesopotamia.

Notice how Mesopotamia lies between the desert on the south and the mountains on the north. The rainfall is only about 5 or 10 inches and falls in the cool winter. The

hot summers are dry, so that Mesopotamia really has a dry Mediterranean climate. The upper part of the basin is slightly undulating, and the two rivers are fed by the snows from the mountains of the Armenian Knot. In their lower courses the rivers, now uncontrolled, overflow their banks and give rise to dreary and unhealthy marshes. Along the rivers, where a little irrigation can be easily practised, there are fields of cotton, wheat, millet, sesame, maize, and tobacco, with date-palms and sugar along the lower reaches of the river. Most of the land is barren waste or at best a poor steppeland.

There are three towns of importance in Mesopotamia. *Mosul* is on the Tigris, near the site of the ancient Nineveh and at the head of navigation of the Tigris. It is in such a position as to control the trade route of Upper Mesopotamia. *Baghdad* is situated on the Tigris, but at a point where the two rivers approach very closely together. Near by, but on the Euphrates, is the site of Babylon. *Basra* is the port of Mesopotamia, situated on the combined delta and accessible to ocean steamers.

## THE PLATEAU OF ARABIA

Arabia and Syria form a great plateau one-third as large as Europe, sloping from west to east. The rainfall is very low and the greater part is desert. In the centre there are a number of oases, surrounded by poor grassland. In the past these oases have been the home of peoples who, driven out by famine, have spread far and wide. They are the Arabs. There is a certain amount of cultivation round the edges of the plateau, particularly in the province of Yemen, where the famous Mokka coffee is grown. Dates are exported from Muscat. Notice on the map the position of Mecca, the most sacred place of pilgrimage for Mahomedans. Jidda is its port. Notice also the British coaling-station of Aden.

That part of the plateau which lies near the Mediterranean Sea is known as Syria, including Palestine. There is a narrow coastal strip, with a Mediterranean climate and where the olive, lemon, orange, and vine are grown.

A curious feature is the rift-valley of the River Jordan running from north to south across the plateau.

To the east of the rift-valley, around Damascus, barley and other cereals are grown.

Palestine is the "Holy Land" of the Jews and Christians, and there are many famous old cities of which Jerusalem is the chief. *Jaffa* is the principal port.

Palestine is now under British Administration, Syria in the north is under the French.

### TRADE ROUTES OF SOUTH-WESTERN ASIA

The part of Asia we have been studying lies between Europe and India, and from earliest time the trade routes in this part of Asia have been of great importance. Owing to the large areas of desert and high mountains there are only a few possible lines for trade routes. Study Fig. 233 carefully.

Long ago two of the most civilised and important countries in the world were Egypt, the valley of the Nile, and Mesopotamia (then forming the Empires of Babylon and Assyria), the valley of the Tigris and Euphrates. You will see that there is only one route between the two countries which avoids the desert. This route passes through Palestine and Syria through Damascus to the upper part of the Euphrates. Note how important Palestine was. For long it formed a buffer State between the powers of Egypt and Babylon or Assyria.

In modern times, amongst the world trade routes one of the most important is between Europe and India. As you know, most of the trade passes through the Suez Canal. That is a sea route and is largely controlled by

Great Britain. Before the war Germany tried to gain control of a great land route which should connect Europe and India. The Baghdad railway was planned to run from

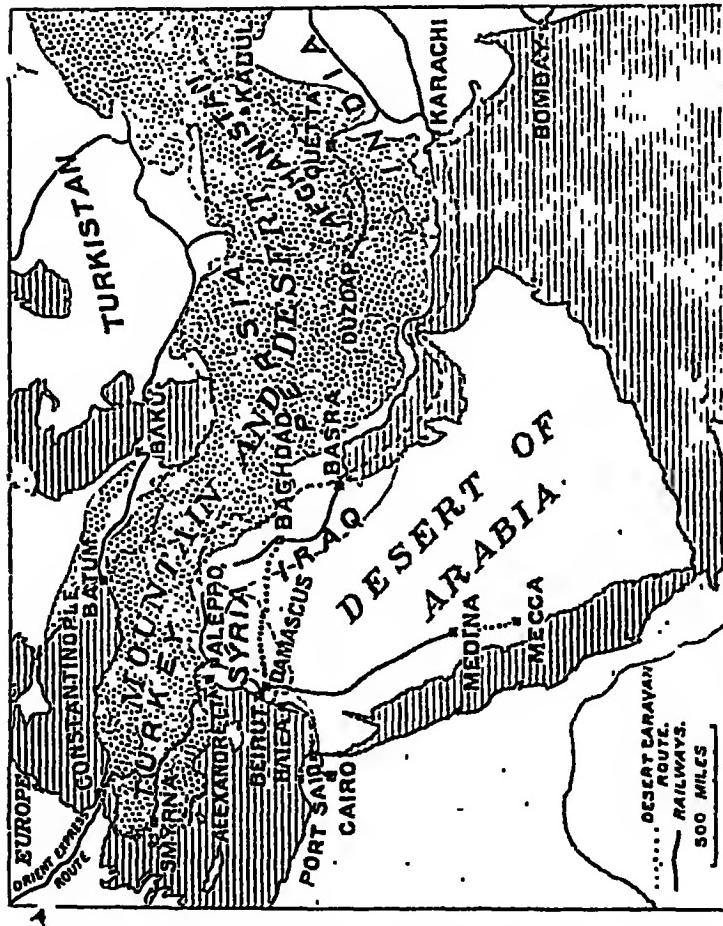


FIG. 233.—Trade routes of South-Western Asia.

Notice the great importance to India of the Bagdad railway. It is not yet finished between Aleppo and Bagdad, and the railway service between Constantinople and Aleppo is very bad. In the future we may hope to have a railway from Karachi to Bactra and be able to travel by train very quickly from India to Europe. Notice the key position of Aleppo between the desert and the mountains. There is a motor service across the desert between Damascus and Bagdad.

Constantinople through Baghdad to the Persian Gulf, and probably to Karachi to join the Indian railways. This great railway scheme is now controlled mainly by Great Britain, and the railway may later be completed from

opposite Constantinople to the Persian Gulf (Basra). In both the old and new routes notice the position of *Aleppo*, where the old caravan routes and the railway come down through the famous pass known as the Cicilian Gate from the plateau of Asia Minor to the Mesopotamian Plains. Near by is the port of *Alexandretta*, as well as the old port of Antioch which it has replaced. Study the map; it will teach you most about these routes.

#### QUESTIONS AND EXERCISES

1. Describe and account for the climate of Asia throughout the year.
2. Where are the Monsoon Lands of Asia? How does the climate vary from one part to another?
3. Give an account of the mountain systems of Asia.
4. What do you understand by "festoons" used in a geographical sense? Give examples.
5. What influence has the Himalayan Range had (a) on the climate, (b) on the races and occupations of Asia?
6. Describe the climate of Japan.
7. What are the principal ports of China? Account for their importance.
8. Compare the foreign trade of India with that of China.
9. What railways do you think are necessary for connecting India with the surrounding countries?
10. Account for the importance of the following ports: Singapore, Colombo, Calcutta, Bombay, Shanghai, Yokohama, Aden.
11. Describe the main routes (land, sea, and air) between Europe and Asia.
12. Write a description of a journey in summer along the Trans-Siberian Railway from Vladivostok to Moscow.
13. Write a description of the physical features, climate, and productions of Indo-China.
14. Write what you know of Java.
15. Draw sketch-maps to show routes between India and China.
16. How do you account for the rapid rise of Japan?
17. Where and what are the following: Fuji Yama, Hakodate, Taiwan, Babylon, the Dead Sea, Yarkand, Darien, Mecca, Tarim Basin, Red Basin, Tiflis?

## B. EUROPE

### 1. POSITION AND SIZE

WITH the exception of Australia, Europe is the smallest of the continents. But it is the most densely populated, and may be called the most important. The area of Europe is only 3,760,000 square miles, or twice the size of India. In comparison with its size Europe has the longest coast-line of any of the continents; everywhere there are inland seas, deep bays and gulfs, so that no part of Europe is 1000 miles from the sea. Compare this with Asia, where the centre of the continent is nearly 2000 miles from the sea. Fig. 234 is a map of Europe showing the important lines of the latitude and longitude. Europe is almost entirely in the North Temperate Zone; only a small piece in the north lies inside the Arctic Circle ( $66\frac{1}{2}^{\circ}$  N.). Now notice the position of latitude  $40^{\circ}$ ; it cuts Spain and Portugal nearly in half, cuts off the "toe" of Italy, and passes through Greece; runs south of the Black Sea and through the Caspian. Note also that the British Isles lie between latitude  $50^{\circ}$  and  $60^{\circ}$ . The all-important line of longitude,  $0^{\circ}$ , the meridian of Greenwich, passes, of course, through Greenwich, which is a part of London. Through the heart of Russia runs  $40^{\circ}$  E.

### 2. PHYSICAL FEATURES

Although Europe is such a small continent, its physical features are very varied. It may be divided roughly into three parts:

- (a) The mountain masses of the north, consisting of old hard rocks.
- (b) The great European Plain, formed partly of young soft rocks and partly of old rocks which have been worn down in the course of long ages into plains.
- (c) The great series of Young Fold Mountains in the



FIG. 234.—The position and size of Europe.

Notice very carefully the position of the Arctic Circle cutting across the north of the continent and of latitude 40° N., going right through the Mediterranean Sea. The outline of India shows how small Europe really is.

south formed of many mountain loops, enclosing small plains and plateaux.

**The Mountain Masses of the North.**—There are now four masses, each consisting of old hard crystalline rocks. Probably the four masses were once joined up forming a single piece of land. The largest mass is the Scandinavian Mountains; the second mass forms the

Highlands of Scotland; the third mass the north of Ireland; the fourth mass constitutes the island of Iceland, but there the old rocks have been covered up by lavae poured out of volcanoes.

**The Great European Plain.**—Much of the great plain which covers Northern Europe is less than 500 feet above sea-level, and nearly the whole of it is less than 2000 feet. But it is not an absolutely flat plain like the plain of the Ganges. It is broken up by small hills, and sometimes even by small mountain ranges. We shall learn about these when we come to deal with each country.

**The Young Fold Mountains.**—Just as in Asia we started from a great central knot of mountains, so we can start from a central knot in Europe. That knot is formed by the Alps. The Alps themselves form a short curve from west-south-west to east-north-east. The western end of the chain swings southwards, then eastwards, and then runs south-eastwards through Italy as the Apennines, curving westwards again through the toe of Italy, into Sicily. From Sicily to North Africa there is only a small gap, and the same line forms the important Atlas Mountains of Africa. The Atlas mountains consist of two or more parallel ranges. A branch curves away northwards and runs into Spain as the Sierra Nevada. Study all these ranges carefully in Fig. 235.

From the western end of the Alps another branch runs south-westwards, but it is soon cut off by the sea, to be continued later as the Pyrenees and the Cantabrian Mountains.

From the eastern end of the Alps there are really three main branches. One runs south-eastwards as the Dinaric Mountains into the Balkan Peninsula, where it divides. A second runs eastwards and is cut across by the Danube, only to be continued in a long curve like an "S" written backwards, forming the Carpathians, Transylvanian Alps, and the Balkan Mountains. The third branch forms a small loop to the north, surrounding the plateau of Bohemia. Close to the Alps on the north-west lies a small range, the

Jura, parallel to the main ranges of the Alps. The Jura continues northwards as the Black Forest and Vosges.

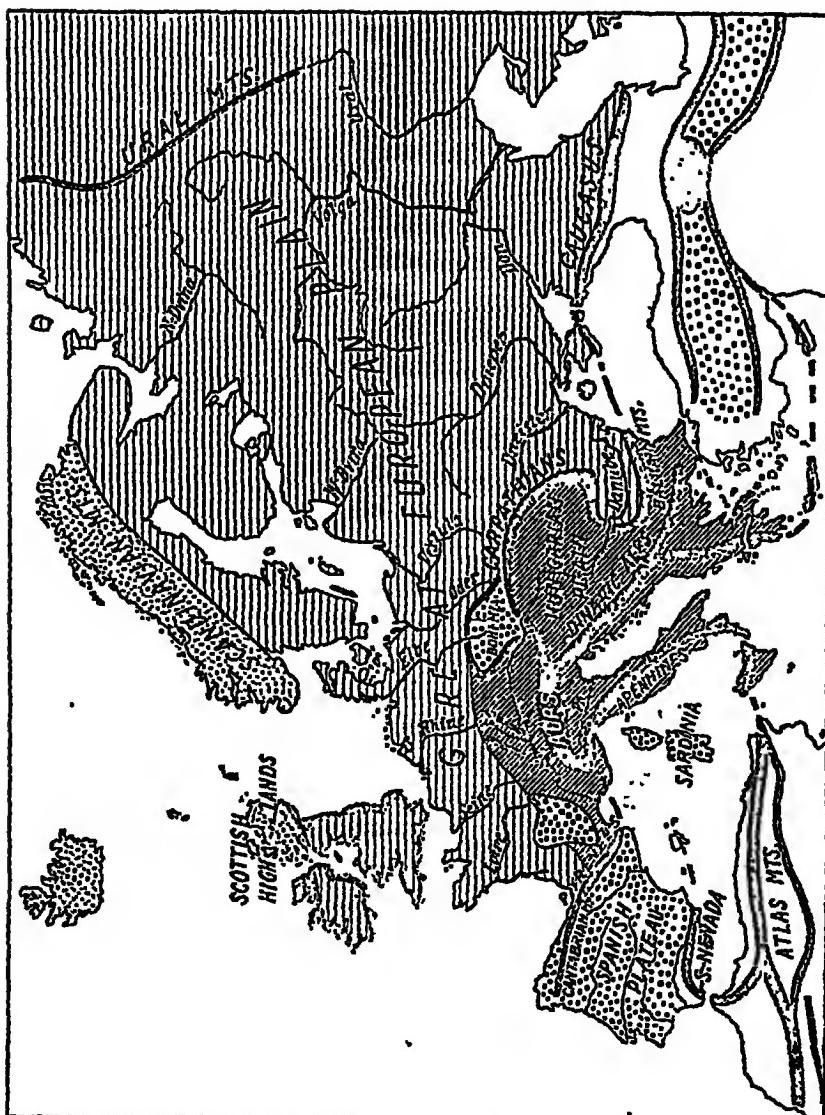


FIG. 235.—The main Physical Features of Europe.

Now let us look at the plateaux, often of old hard rocks, which are enclosed by the fold mountains. Nearly the

whole of Spain is occupied by a high plateau called the Meseta. In the south of France lies the Central Plateau, west of the Alps. To the north of the Alps the land slopes gradually from the mountains to the Great Plain. The Bohemian Plateau we have already mentioned. The islands of Sardinia and Corsica form the remnants of another plateau of old rocks.

The two most important plains enclosed by the mountain chains are the valley of the Po and the great Hungarian Plain.

**The Rivers of Europe.**—Europe has many rivers; most of them are small, but they are important because they are of great use to the busy industrial countries through which they flow. We may separate the larger rivers into three groups :

(a) Rivers flowing northwards from the fold ranges to the sea on the north side of the mountains.

(b) Rivers on the south side of the mountains.

(c) The rivers of Russia.

*Rivers flowing Northwards.*—In France are the Loire and the Seine; in Germany, the Rhine, Elbe, Oder; and in Poland, the Vistula.

*Rivers to the South of the Mountains.*—This group includes the rivers of Spain and Portugal—the Douro, Tagus, Guadiana, and Guadalquivir emptying into the Atlantic Ocean, and the Ebro into the Mediterranean. In France is the Rhone, and in Italy the Po. One of the most important rivers of Europe is the Danube, which rises to the north of the Alps but which flows east-south-eastwards, cutting through three important ranges before it reaches the Black Sea.

*The Rivers of Russia.*—The longest river in Europe is the Volga, which does not enter into the ocean but flows into the largest salt lake in the world—the Caspian Sea. The greater part of Russia lies in the basin of the Volga. In South Russia are the Dnieper and the Don, flowing into the Black Sea; in North Russia, the Western Dwina and the Northern Dwina.

When we study the British Isles we shall learn of the small but important rivers of those islands.

### 3. GEOLOGY

The geology of Europe is too complicated to describe here, and it will be described where necessary under the separate countries. We may, however, remember that the mountain masses of the north consist of old hard crystalline rocks, and so do some of the smaller plateaux of the south. Just as the Himalayas in India are much younger than the Deccan Plateau, so the Alps and the other fold ranges are for the most part much younger than the plateaux. The Alps were, indeed, formed at the same time as the Himalayas.

Thousands of years ago, Europe was very, very much colder than it is now. It was so cold that seas and rivers were frozen, and any rain or snow which fell was not melted but stayed where it fell. Gradually the snow and ice built up an enormous mass of solid ice, thousands of feet thick, called an ice-cap. This mass of ice covered the whole of Northern Europe. It had its centre near the Scandinavian Mountains, and as the mass in the centre increased, so the sheet gradually spread outwards, moving very slowly. An ice-cap almost exactly like this covers Greenland at the present day. As the great heavy mass of ice moved, it covered up large areas of land, scooped out hollows in the hard rocks, and crushed the fragments to pieces. All this happened long after the mountain chains were formed, and when the shape of Europe was very nearly the same as it is now. Man was already living on the earth. Later it became warmer again, and the ice melted. A great part of the North European Plain is covered by a thick mass of boulder clay or sands—the rocks which were crushed to pieces by the ice. Look at the map of Europe in your Atlas and notice the large numbers of lakes in Sweden and Northern Russia. These lakes occupy hollows scooped out by the ice-sheets.

#### 4. CLIMATE

**Conditions in the Cold Season.**—To understand conditions in Europe in the cold season we must remember what we have learnt of the regular wind systems of the globe. At this season the sun is shining vertically south of the equator, and the wind systems are south of their normal position. The whole of Europe then lies in the South-West Anti-Trade Wind belt, and Europe enjoys the warm, moisture-laden winds from the Atlantic Ocean. The western coasts of the continent are also bathed by a warm current—the North Atlantic Drift—which is a continuation of the Gulf Stream. The western part of the continent is thus kept warm by both winds and currents. The eastern part of the continent, on the other hand, is a long way from the Atlantic Ocean with its warm winds and warm currents, but is very near the great land mass of Central Asia, which, as we have already learnt, gets very, very cold. So we find that in Europe in the cold season it gets colder and colder as we travel from west to east. Notice that the rain-bearing winds come from the west, and, as we should expect, the west gets more rain than the east. Rain falls over nearly the whole of Europe at this season, but most falls where there are mountain ranges to intercept the winds.

**Conditions in the Hot Season.**—At this season of the year the sun is shining vertically over the Tropic of Cancer—that is, over the north of Africa and only a little to the south of Europe. The wind systems of the world have moved to the north, and so only the northern part of Europe is under the influence of the South-West Anti-Trade Winds. The southern part of Europe, namely, the countries surrounding the Mediterranean Sea, forms part of the high-pressure belt which you learnt surrounds the globe just outside the Tropics. It is from this high-pressure belt that the North-East Trade Winds start. In the hot season, then, the Mediterranean lands do not

receive any cooling or rain-bearing winds from the Atlantic Ocean. Instead the countries get very hot and receive

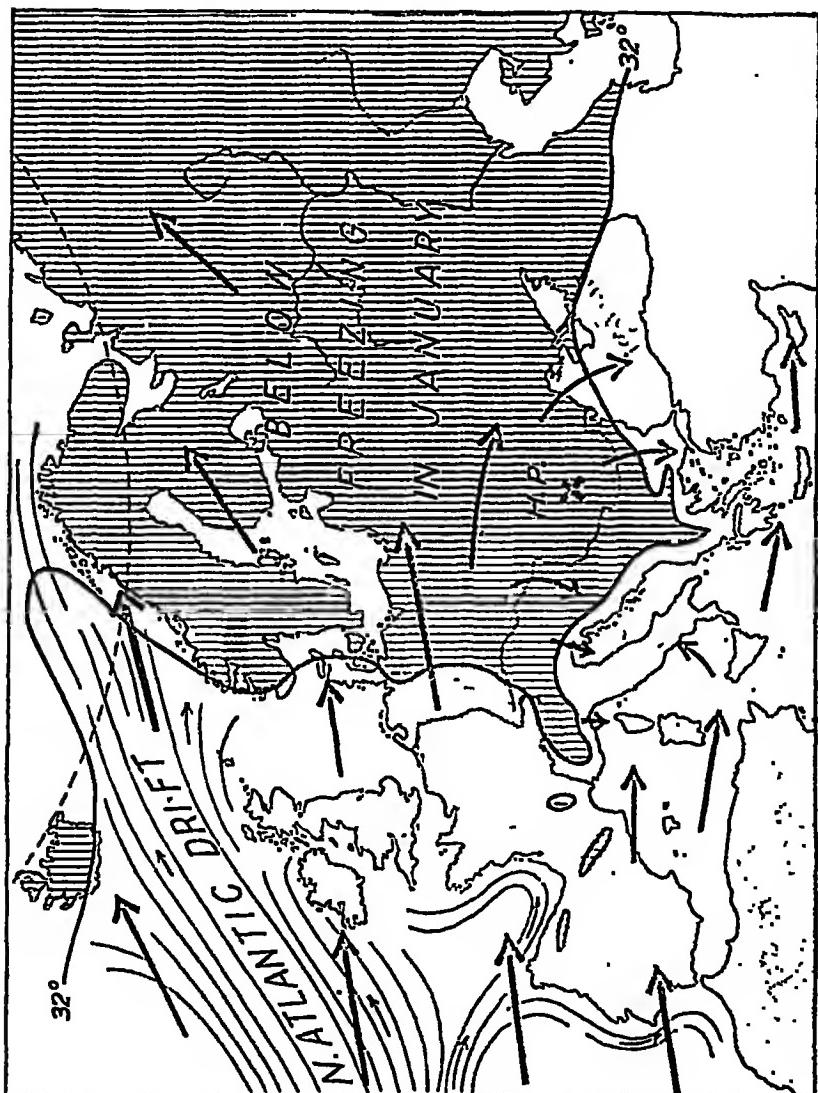


FIG. 236.—Climatic conditions—cold season. Actual temperatures are shown, *not* isotherms.

no rain. Summarising, we see that the countries in the south of Europe have a wet, warm winter when the South-West Anti-Trade Winds are blowing, and a hot dry summer.

This is the typical "Mediterranean Climate," or Winter Rain Climate.

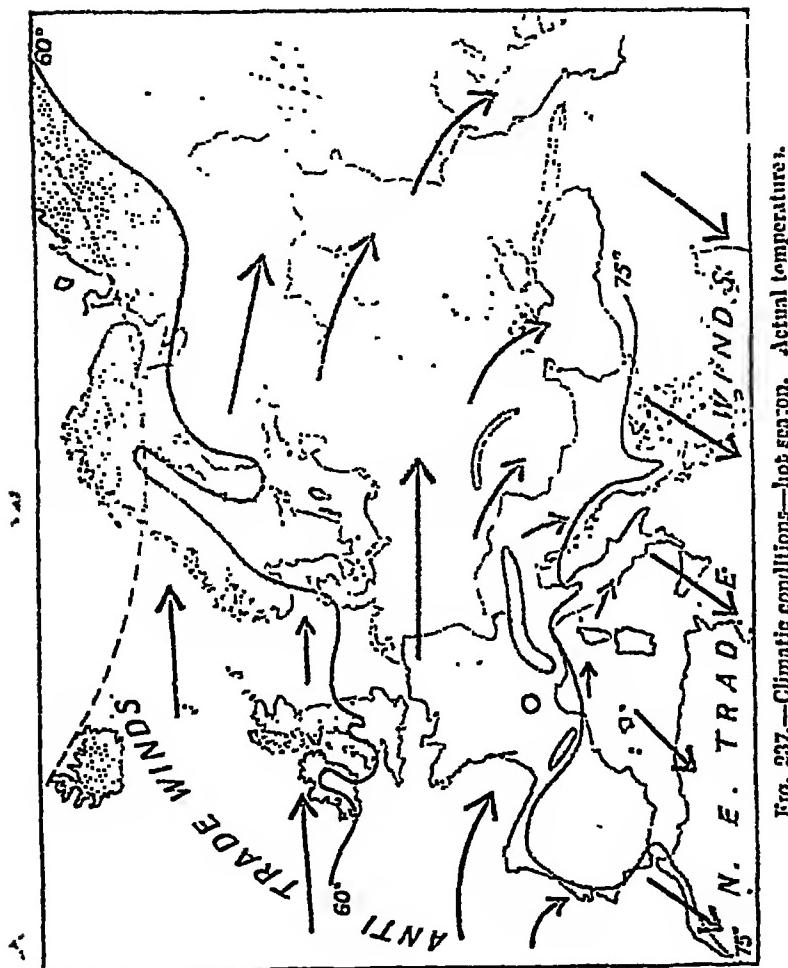


Fig. 237.—Climatic conditions—hot season. Actual temperature.

If we look at the temperature of the rest of Europe in the hot season we see that it gradually gets colder and colder as we go northwards (Fig. 237). This is quite

different from what we found in the cold season. Since Northern Europe is under the influence of the South-West

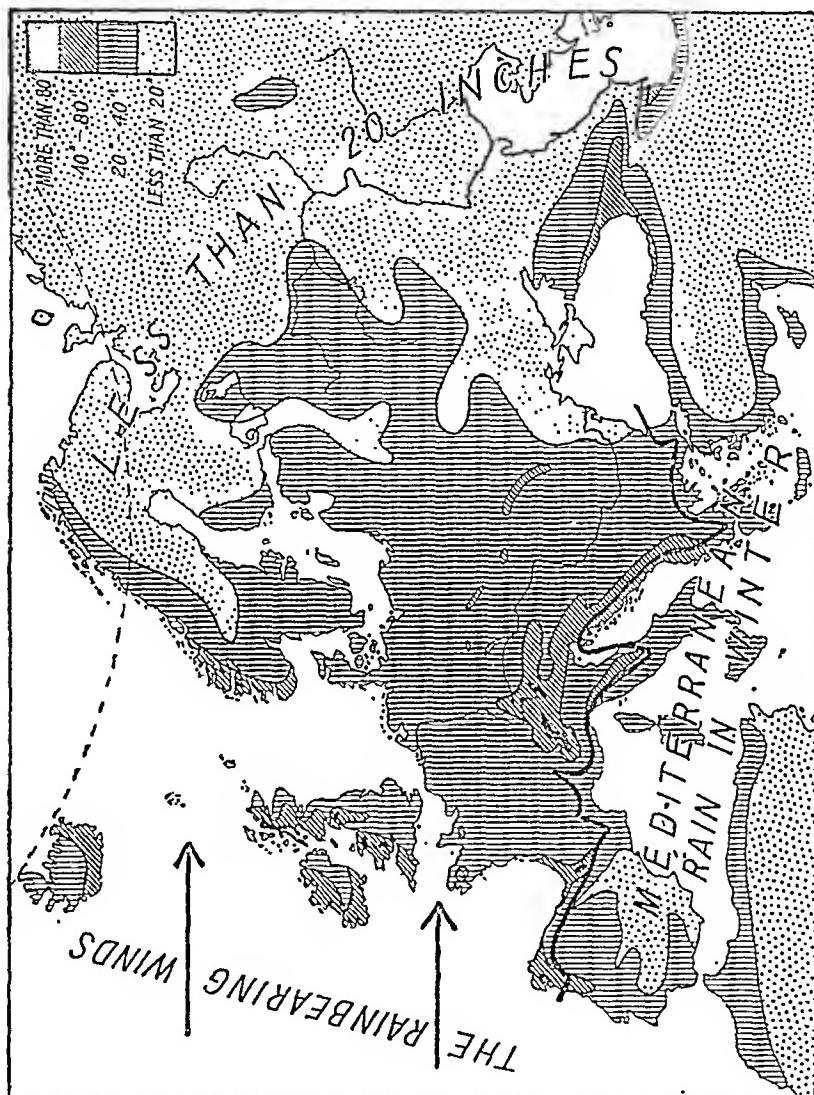


FIG. 238.—Rainfall map of Europe for the whole year.

The thick black line separates the winter rain region from the rain all the year region.

Anti-Trade Winds all the year, so rain falls all the year. But the Anti-Trade Winds do not blow as regularly as our Monsoons. They are more like a river which has

many small whirls and circles of water. You have learnt that these whirls are cyclones and anti-cyclones. Rain falls mainly when there is a cyclone passing over the country.

**Climates of Europe.**—Summarising the temperature, pressure, and rainfall, we can divide Europe into



Fig. 239.—Climatic regions of Europe.

(After Kendrew, "Climates of the Continents.")

the climatic regions shown in Fig. 239. Study that carefully.

## 5. VEGETATION

Many of the countries of Europe are very thickly populated, and the natural vegetation has been removed by man over large areas, especially in the British Isles, France, and Germany. Fig. 240 shows these natural

vegetation regions, but remember that artificial vegetation grows over very large tracts. Notice how closely the

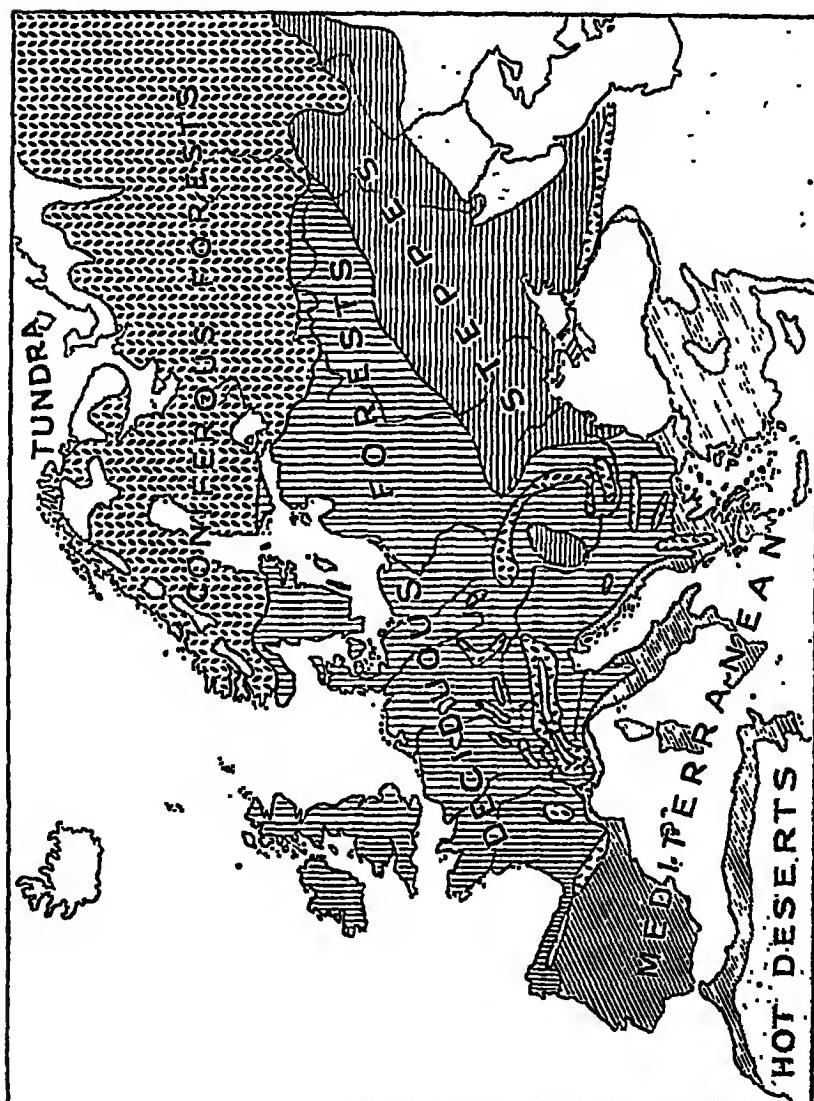


FIG. 210.—The natural vegetation of Europe.

vegetation regions correspond with the climatic regions. We can use them as the major natural regions of the continent.

### 6. POPULATION

Except in the extreme north or in parts of Russia and the south-east, Europe is inhabited entirely by peoples of the White or Indo-European race. There are three main divisions. The people of the north, the Nordics, are tall, pale coloured, and usually with light hair and eyes. The people of the south, the Mediterranean peoples, are darker skinned, not so tall, and have dark hair and eyes. Between these two, in Russia and Central Europe we find the Alpine peoples, with broad, flat faces and heads which are short

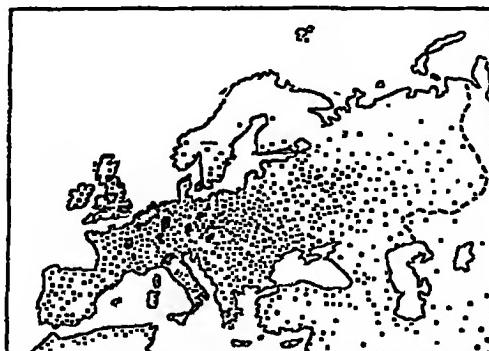


FIG. 241.—The population of Europe.

This map is on the same scale as the population map of Asia, Africa, and America, so that you can compare them. Each dot represents 500,000 people.

when measured from back to front. Look at the population map and notice where most people live. They live largely in the great industrial regions.

In the south-east of Europe, on the steppes and the grasslands of Hungary, there are Mongolian peoples (the Magyars of Hungary and the Cossacks of Russia).

### 7. THE COUNTRIES OF EUROPE

Although Europe is such a small continent it is divided up into a large number of countries. Many of the great

civilisations of the ancient world arose round the Mediterranean Sea, and in turn the Mediterranean countries have been centres of vast Empires—Greece, Rome, and Spain. But the climate of the Mediterranean is too kind ; it has resulted in lazy habits which in time undermine even the greatest Empires. The centres of the great empires and great civilisations have moved to the countries of Northern Europe with their more vigorous climate—Great Britain, France, Holland, Belgium, and Germany.

The countries of Europe may be grouped according to their geographical position :

**Countries of the North-West.**—British Isles, Norway, and Sweden.

**Countries of the Great European Plain.**—The Baltic States, Poland, Germany, Denmark, Holland, Belgium, and France.

**Countries of the Mediterranean.**—Spain and Portugal, Italy, Albania, and Greece.

**Countries of Central Europe and the Danube Basin.**—Switzerland, Austria, Czechoslovakia, Hungary, Yugoslavia, Rumania, and Bulgaria.

**Eastern Europe.**—Russia.

Out of the 27 countries of Europe, 7 are empires with foreign possessions, 5 are kingdoms without foreign possessions, 3 are republics with foreign possessions, whilst 12 are republics without.

#### QUESTIONS AND EXERCISES

1. Compare and contrast the physical features of Europe with those of Asia.
2. What geographical factors have helped Europe to become the most important of all the continents ?
3. Construct a sketch-map of Europe to show the distribution of the chief races of people.
4. In what natural vegetation belts do the following countries lie : England, Norway, Belgium, Hungary, Italy, South Russia, and Switzerland ?
5. What distinct types of climate are found in Europe ? Give a brief description of each type, stating where they are found.
6. Compare and contrast the climates of the countries in the West of Europe with those in the East of Asia.

## THE BRITISH ISLES

The British Isles consist of a number of small islands and two large islands (Great Britain and Ireland) lying off the north-west coast of Europe. The south-east coast of Great Britain is separated from the mainland of Europe by the Straits of Dover.

The island of Great Britain consists of the three countries, Scotland in the north, Wales in a part of the west, and England occupying the remainder. England, Scotland, and Wales have been joined under one king since 1603.

Since 1920 Ireland has been divided into "Northern Ireland" and the "Irish Free State." Northern Ireland has a parliament of its own, but is very closely joined with Great Britain, but the Irish Free State is quite independent, forming one of the members of the British Empire.

"United Kingdom" used to mean the United Kingdom of Great Britain and Ireland, now it means the United Kingdom of Great Britain and Northern Ireland.

These things are a little difficult to understand, but try and remember the difference between the "United Kingdom," "Great Britain," and "England."

### BRITISH ISLES: POSITION AND SIZE

Two lines of longitude ( $0^{\circ}$  and  $10^{\circ}$  west) and two lines of latitude ( $50^{\circ}$  and  $60^{\circ}$ ) make a rectangle. Notice that the British Isles lie almost entirely inside this rectangle. The British Isles together cover about 121,000 square miles--roughly the same size as the Bombay Presidency. England is the largest country (51,000 square miles), and is a little smaller than Assam. Great Britain is larger than Bengal but smaller than the Punjab, but has roughly the same number of people as Bengal or the United Provinces.

**BRITISH ISLES: PHYSICAL FEATURES**

The seas surrounding the British Isles are shallow; in other words, there is an extensive continental shelf (see p. 67). The British Isles have a very long coastline, or the coasts are deeply indented so that no part of the country is very far from the sea. There is no place in the British Isles which is 100 miles from the sea, and there are very few people who have never seen the sea.

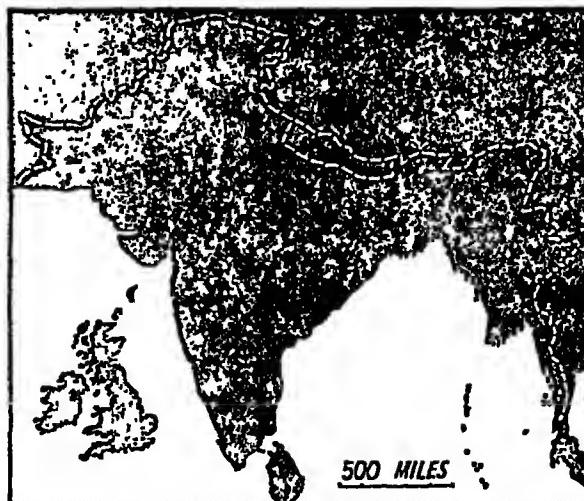


FIG. 242.—The size of the British Isles and India compared.

The western coast of Scotland is a fiord coast with many islands (the Inner and Outer Hebrides), but the openings on other parts of the coast are mainly river mouths. To the North of Scotland lie the Orkney and Shetland Islands; to the south of England is the Isle of Wight; and between Great Britain and Ireland is the Isle of Man.

There are no very high mountains in the British Isles. The highest is Ben Nevis, in Scotland, about 4,400 feet. But many parts of the islands are hilly, or even mountainous. In general the mountains are in the north and west.

Scotland falls into three parts. The Highlands occupy the northern half and form one of the masses of

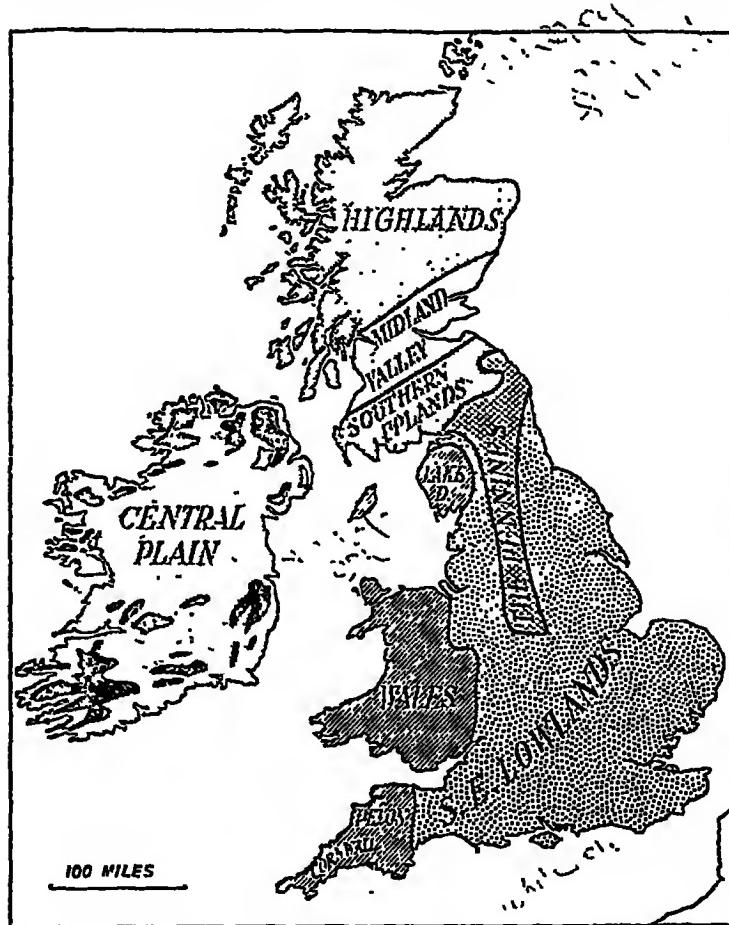


FIG. 243.—The main physical divisions of the British Isles.

old hard rocks about which we spoke under Europe. Running across the south of Scotland lie the Southern Uplands, a long fold range. Between the Southern

Uplands and the Highlands is the most important part of Scotland—the Midland Valley.

**England and Wales.**—If we draw a line across England and Wales from south-west to north-east (see Fig. 243), we find the old rocks and the mountainous regions lie to the north-west, whilst to the south-east are mostly young rocks and lowlands. To the north-west there are three main areas of mountains—

- (a) The lake district of the north (Cumbrian Mountains).
- (b) Wales, consisting of very old rocks in the north (Cambrian Mountains), but with a great coal basin in the south (South Wales Coalfield).
- (c) Devon and Cornwall, rich in minerals and consisting of granite masses intruded into old rocks.

Then running down the centre of the north of England is its backbone, the Pennine Chain. Part of the great Midland Plain wraps round the southern end of the Pennine Chain and separates it from the other hill masses.

The south-east of England consists of low ridges running from south-west to north-east, marking the outcrops of successive beds of rock. In the extreme south-east is an arch or anticline running from east to west (the Weald), whilst London lies in the syncline (London Basin).

Ireland is like a saucer, a central lowland surrounded by a rim of mountains. The mountains in the north (Donegal Mountains) once joined the Highlands of Scotland; the mountains of the south-east (Wicklow Mountains) were once part of the Welsh mass.

**Rivers.**—The rivers of the British Isles are short, and since the mountains are usually on the western sides of the islands, most of the longest ones flow eastwards. The rivers are not as a rule swift enough to supply hydro-electric power; they are too shallow to be used by river steamers, but they are very important commercially, because their mouths are often navigable by the largest ocean-going vessels and afford excellent harbours. They are not subject to floods, but have a gentle flow of water, keeping the harbour clear, all the year round. They are

never frozen. Look carefully at the map and note the position of these rivers, with the ports which lie near their mouths : Dee, Tay, Forth (east of Scotland), Tyne, Tees, Humber, Thames (east coast of England), Clyde (west of



FIG. 241.—The Continental Shelf round the British Isles.

(From Longmans' "Geographical Series," Book III.)

The shallow seas (all parts shown in white are less than 600 feet deep) afford fine breeding and feeding grounds for fish and so give rise to the great fisheries.

Scotland), Mersey and Severn (west of England). The only large river in Ireland is the Shannon.

#### BRITISH ISLES: MINERALS

Considering its size, Great Britain is very rich in coal. Coal never occurs in the oldest rocks, and so in Scotland is only found in the Midland Valley. In England the coal-seams were originally deposited right across the north and midlands of the country, but they are now found in a

number of isolated basins arranged on each side of the Pennine Chain, thus :

Cumberland	Pennine	Northumberland and Durham.
Lancashire	Chain	Yorkshire.
North Staffs		Nottinghamshire (Notts)
South Staffs		Leicestershire.

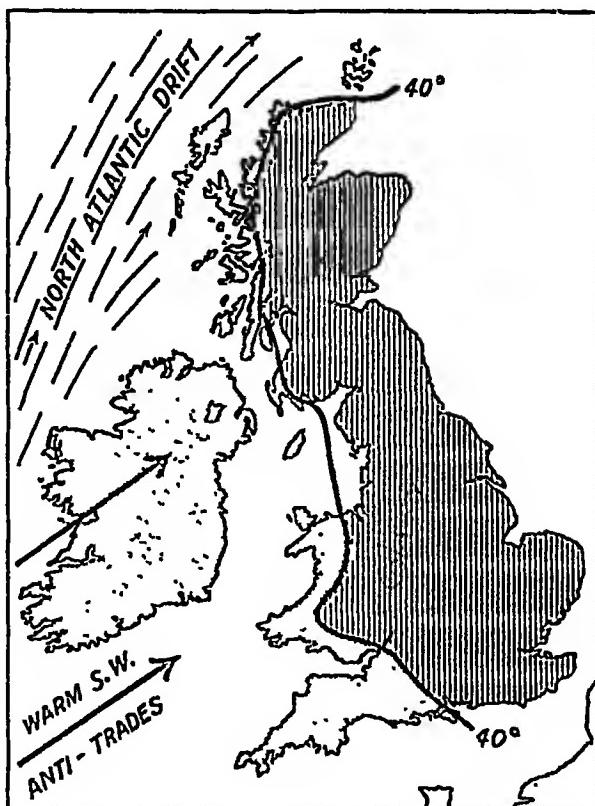


FIG. 245.—British Isles—January isotherms.

In winter the west coast is kept warm by the North Atlantic drift, and so the whole of the west coast is warmer than the east coast. Compare the isotherm of 32° shown on Fig. 236.

In South Wales is another very important field, in the western part of which anthracite is found. Ireland is very poor in coal.

Iron ore used to be worked in the coalfields, but is

now mostly obtained as low-grade bedded ores in the sedimentary rocks in Yorkshire (Cleveland Hills) and the Midlands. Not enough is produced, and better iron ore is imported from Spain and Sweden. There is plenty of limestone for flux.

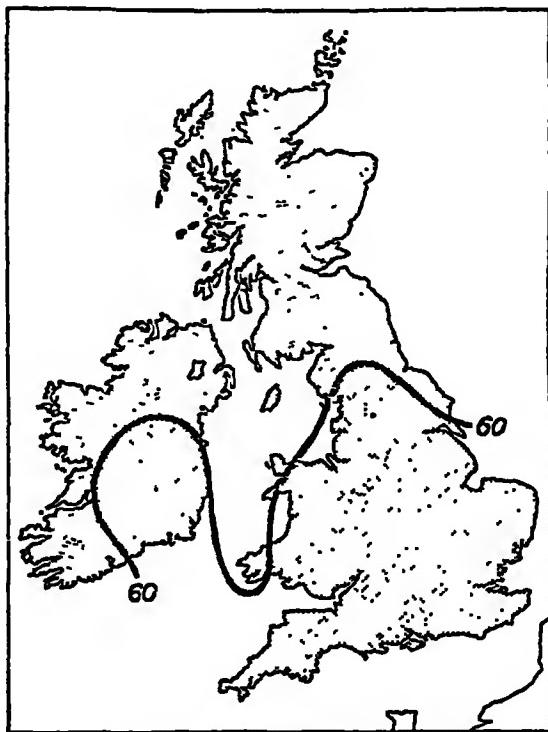


FIG. 240.—British Isles—July isotherms.

The sun is shining over the northern tropic, and the south of the British Isles is warmer than the north.

In the old days England used to be famous for other minerals. Much tin and copper was mined in the southwest (Cornwall); small quantities of lead are still produced in Wales and Derbyshire, but Great Britain depends mainly on foreign supplies of these metals. The old hard rocks of

the Highlands afford excellent building stones (granite); the old rocks of Wales give good slates. Enormous quantities of cement are made from a soft white limestone known as chalk, in the south-east.

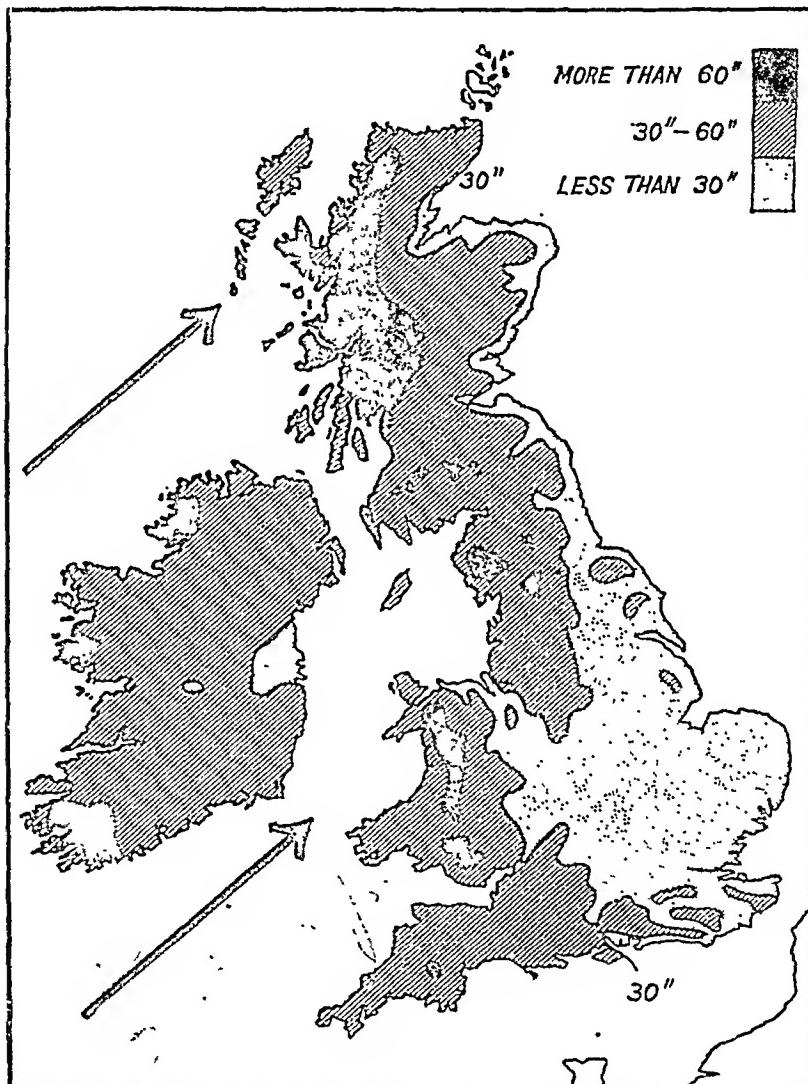


FIG. 247.—British Isles—Rainfall map.

Notice that the heaviest rainfall is on the hills and in the west.

## BRITISH ISLES: CLIMATE

The British Isles have a milder and more equable climate than any other land so far away from the equator. This is due mainly to the warm North Atlantic drift and

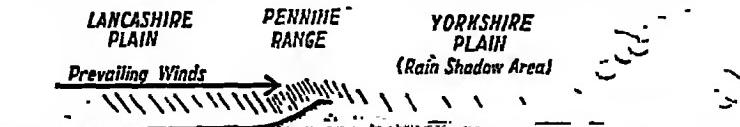


FIG. 248.—Section across the Pennine Chain, showing the rain-shadow area on the east.

the continual influence of the warm moist south-west Anti-Trades. In winter the east is colder than the west, in summer the north is colder than the south. Study Fig. 245 for an explanation of this. The highest land is in the west, so the greatest rainfall is in the west; Eastern England lies in the "rain-shadow" of the Pennines and western mountains. We must remember that the Anti-Trade Winds do not blow steadily like our Monsoons. The *general current* of air is from the south-west, but actually there are many eddies and whirls in the main current. The daily weather in England is determined by these eddies or whirls which we know are called cyclones and anti-cyclones. A continual series of cyclones and anti-cyclones crosses the North Atlantic from west to east, and passes over the British Isles. When a cyclone comes there is rain, but an anti-

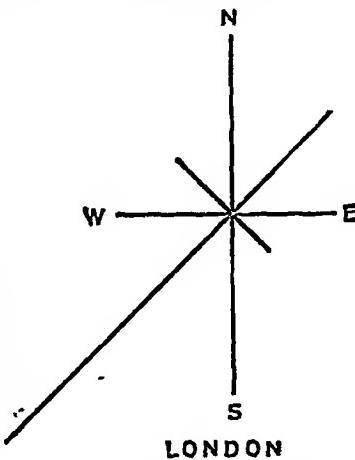


FIG. 249.—A "Wind Star."

Notice that at London, as at most places in the British Isles, the wind blows most often from the south-west, but during the month or year it blows from all directions.

cyclone brings fine weather. A cyclone in England does not mean the same thing as a cyclone in India. A cyclone in England is simply a local low-pressure centre with mild winds. You will see that, although the general direction of the wind is always from the south-west, the wind may vary very much from day to day. Fig. 249

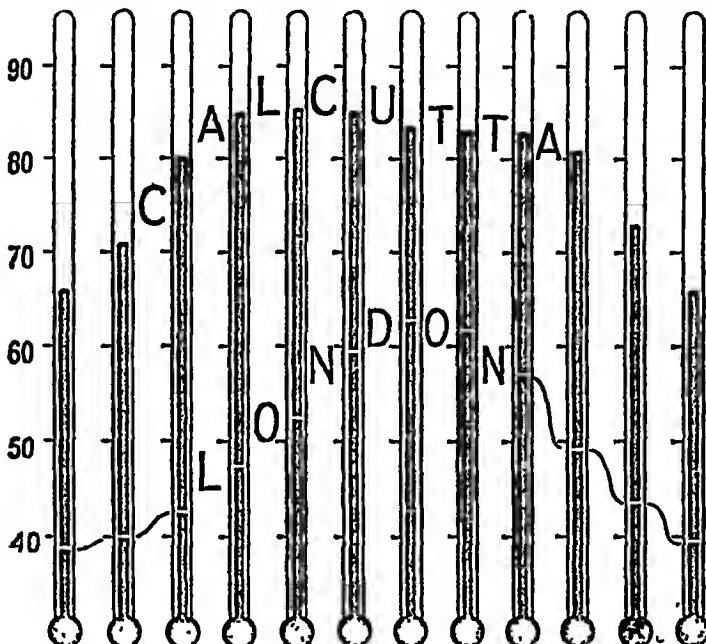


FIG. 250.—A comparison of the temperatures of Calcutta and London.

Both places are near the sea and feel the moderating influence of the sea. But London is colder for the whole year. Compare this with Fig. 302.

shows you a "wind star" for a place in England. People in England have to look at the "Weather Chart" published in the newspapers to find out what the weather is going to be.

#### BRITISH ISLES: VEGETATION AND AGRICULTURE

The natural vegetation in the British Isles is broad-leaved deciduous forest, the trees losing their leaves in the

cold season. Coniferous forests are found in the north and on the hills. But the land is so densely populated that very little natural vegetation is left. There are, however, large areas of the Highlands of Scotland, the mountains of Wales, and the Pennines which are covered with "moorland" in which the principal plant is a small bush, about a

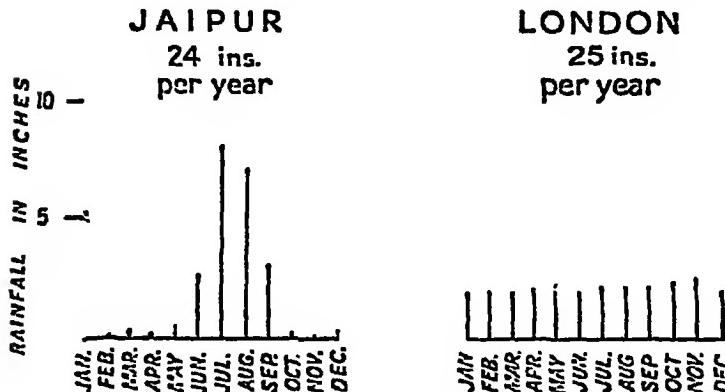


FIG. 251.—A comparison of the rainfall of Jaipur and London.

Both places have roughly 25 inches a year. But Jaipur is in a hot country where water is quickly evaporated and the rain falls mostly in four months of the year. So the vegetation around Jaipur is semi-desert and crops must be irrigated. But London lies in a cooler country where the rain falls gently throughout the year, and the sun is not powerful enough to evaporate the water quickly so that forests will grow and no irrigation is necessary.

foot high, called heather. It forms a thick carpet all over the ground. In Ireland, which is not so thickly populated as England, there are large areas of moorland and, in the lowlands, dangerous bogs. England is essentially an industrial country, and most of the people live in the towns; the remainder of the country is occupied by small farms. The English farmer is a mixed farmer; there are no stretches of untidy waste jungle; everything looks neat and tidy, because the farmer divides his land into small fields separated by rows of bushes or "hedges." The crops are very carefully looked after, and the yield per acre is often higher than in any other country of the world.



[Photo: Central Aerophoto Co., Ltd.]

FIG. 252.—Typical English country.

Notice the many small fields separated by hedges. In the front (centre) are small pieces of land (called allotments) where workers who have no gardens to their cottages grow vegetables. In front (right) is a stretch of common land with a village and a small lake. In the centre (in the distance) is a very big house belonging to a gentleman. Find also a farmhouse.

In Ireland and the wet west of England dairy farming is most important; in the drier east of England wheat is grown. Most of Scotland is too cold for wheat, and so

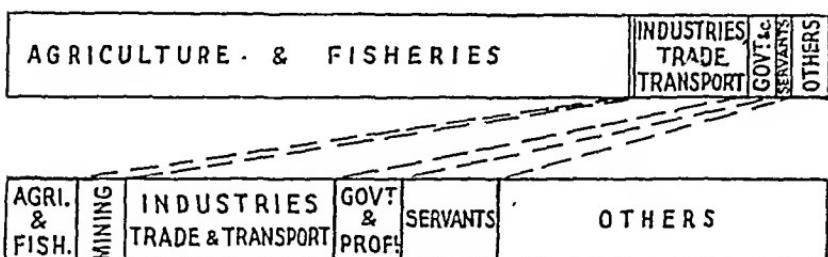


FIG. 253.—Occupations in India and England compared.

In India three-quarters of the people are farmers; in England only eight people out of every 100 are farmers.

oats and barley are grown. But good wheat is obtained cheaply from the great wheat-lands of the world, and more

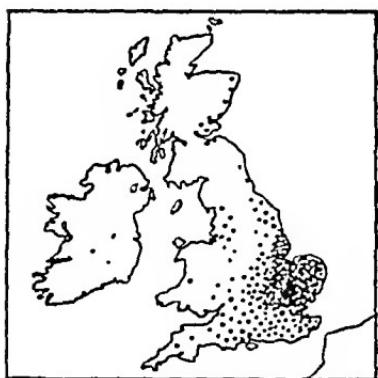


FIG. 254.—The wheatlands of the British Isles.

Notice that they are mainly in the dry south-east. The west of England is too wet; Scotland is too cold.



FIG. 255.—The oat-growing regions of the British Isles.

Oats, like wheat, grow in the drier east, but they can ripen with a colder summer than wheat, and so are largely grown in Scotland.

important often are fruit and vegetables grown for the local markets. Sheep, affording excellent meat, are also reared.

### BRITISH ISLES: FISH

The shallow continental shelf round the British Isles affords ideal breeding-places for fish. All round the coast of the British Isles are fishing villages, and a great variety of fish is eaten by the people of Britain. Most famous of all are the Herring Fisheries of the North Sea.

### THE NATURAL REGIONS OF SCOTLAND

are three in number :

- (a) The Northern Highlands.
- (b) The Midland Valley.
- (c) The Southern Uplands.

The Highlands occupy more than half of Scotland. They consist of old hard crystalline rocks which weather into a very poor soil. The land suffers also from a rainfall which in the west is too heavy, and from cold in the winter. Very little land can be cultivated, and will not even grow good grass. It is covered with moorland, consisting of heather. Conditions along the east coast are much better, and there most of the people live. There are stretches of lowland with a better soil, the summers are warmer and the rainfall is less. The principal crop is oats, and sometimes barley. Whisky is made from the barley. Along the coast are a number of fishing towns which serve as bases for the North Sea fishing fleet. The largest is Aberdeen, which also exports granite for building purposes. Some of the highland streams can be utilised for generating electricity. Off the north of Scotland are the Orkney Islands and the Shetland Islands, famous for ponies.

The Midland Valley or Central Lowlands is by far the most important part of Scotland. Three-quarters of the people live there. The soil is good, both for grass and crops. In the wetter west cattle rearing and dairy farming are carried on; in the drier east crop farming is carried on, and it is warm enough for wheat. But more important are the coalfields, three in number, one in the east, one farther west, and one in the south-west. All

three have given rise to great industrial districts. The eastern coalfield stretches under the Firth of Forth, from Edinburgh to Fife-shire. Edinburgh, the principal town of Scotland, is the centre of this area, and much coal is exported from its port, Leith, to Scandinavia and the Baltic countries. The second field, the Lanarkshire field, lies on either side of the River Clyde. The third or Ayrshire field lies along the western coast, and much coal is sent to Ireland. Iron ore occurs with the coal and gave rise to a great iron industry. The richer iron ore is now exhausted, but the iron industry remains, foreign ore being imported. Along the banks of the Clyde is the chief ship-building area in the world. Glasgow is the great centre of the western industrial region, just as Edinburgh is of the eastern. Engineering and the manufacture of machinery are carried on both round Glasgow and Edinburgh. The manufacture of cotton thread (more important than cotton goods) is carried on in the wetter west at Paisley and Glasgow; woollen mills and chemical works are also found. Oil, wax, and candles used to be made from oil-shale near Edinburgh, but the supplies of good oil shale are now exhausted. Notice how the Firth of Forth and the Firth of Clyde give access for sea-going vessels right into the heart of the country. The two are connected by the Forth and Clyde Canal. Notice also the favourable position of Glasgow for Atlantic traffic and of Edinburgh for trade with Europe. The port of Dundee used to manufacture linen from Russian flax, now it takes most of the raw jute sent by India to Great Britain, and there are large jute mills.

The Southern Uplands are largely grass covered and devoted to sheep rearing. A number of small towns are engaged in the manufacture of woollen cloth.

#### THE NATURAL REGIONS OF ENGLAND

are many. The simplest possible division seems to be into :

- (a) The Lake District.
- (b) Wales, with the South Wales Coalfield.
- (c) Devon and Cornwall.

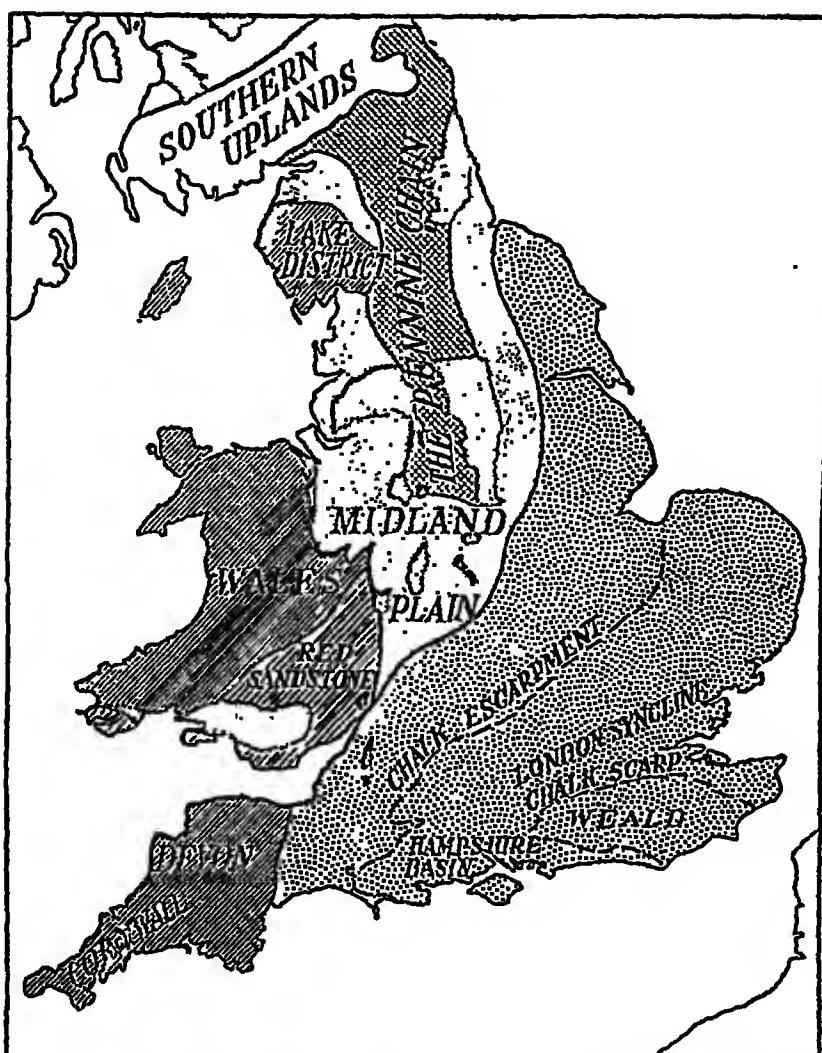


FIG. 256.—The Natural Regions of England and Wales.  
The black patches are coalfields.

- (d) The Industrial Regions of the North and Midlands.
- (e) The Agricultural Regions of the South-east.

The Lake District is an area of old hard rocks, famed for its scenery. The heavy rainfall makes cattle rearing important in the valleys. Various minerals occur in the old rocks; iron ore is mined near Barrow, and has given rise to a ship-building industry.

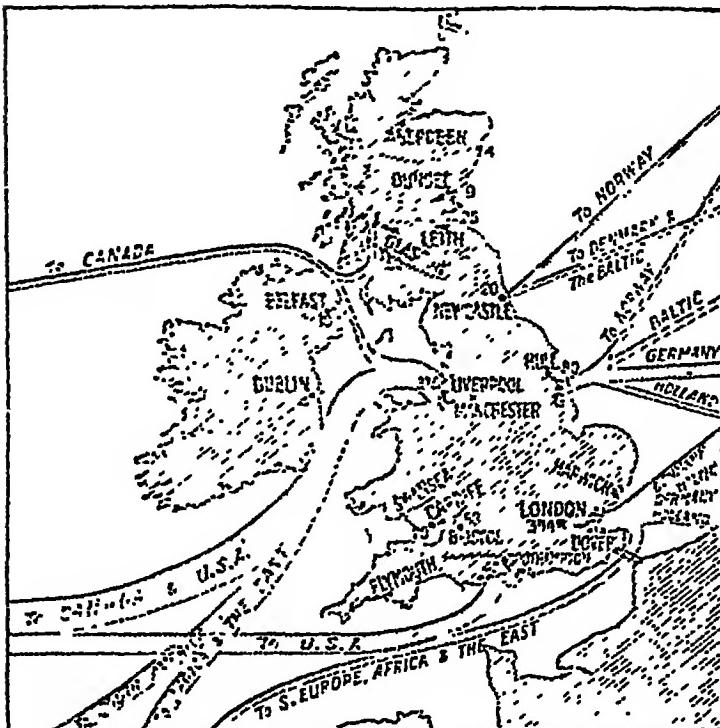


FIG. 257.—The Ports of Great Britain.

Notice the favourable position of London, opposite the continent of Europe.

**Wales.**—North Wales, the area of old hard rocks, is mountainous and thinly populated. Slates, used for roofing houses, are quarried in several places. Cattle thrive on the grassland in the valleys, and sheep on the hill pastures. Further south there is an area of red sandstone, some

of which gives a good soil famous for its apple orchards, hop gardens, and rich cattle pastures. The great coalfield of South Wales is one of the largest in Great Britain. Much of the coalfield is a plateau, cut into by deep north and south valleys. The coal-mining towns are found in

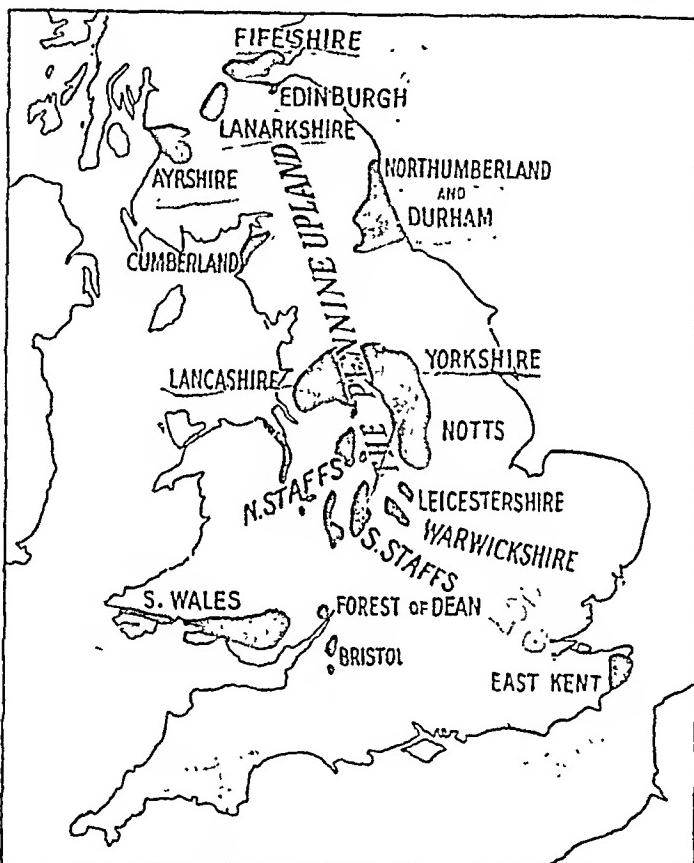


FIG. 258.—The coalfields of Great Britain.

the valleys. Nearly a quarter of the coal mined is anthracite. The principal ports are Llanelli, Swansea, Cardiff, and Newport. Iron ores are brought from Spain and smelted at Port Talbot and Cardiff. Swansea is also the centre of the Tin Plate industry, the tin being

obtained from Malaya. Tin plate is used for making what we usually call "tins." They consist mainly of iron, with just a coating which contains the metal tin. Swansea also

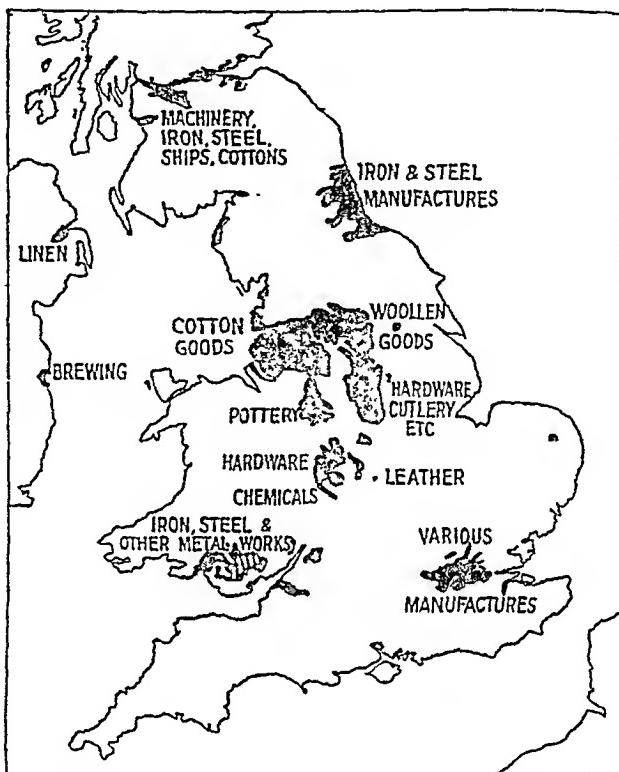


FIG. 259.—The Industrial Regions of Great Britain.

Notice that they are nearly all situated on coalfields.

imports and smelts copper, and there are huge oil refineries there;

Devon and Cornwall used to be famous for minerals—tin and copper—but very little is now obtained. Good quality China Clay (Kaolin) is obtained and sent to the pottery works of the Midlands of England. The region

is wet, and cattle farming is important. Devon is famous for its fine butter and cream. Several of the towns are really local trading centres. Plymouth (with Devonport) is a port of call for Atlantic Liners and a naval base.

**The Industrial Regions of the North and Midlands.**—It has already been explained that the main coal-fields of England lie on either side of the Pennine Chain. The Pennine Chain forms a broad division between the wetter west and the drier east. In days gone by the

Pennines were more important than they are now. On the moors or hill pastures feed the sheep which first gave rise to the woollen industry of the east; from the moors flow down the rivers which provided water and power for growing industrial towns of both east and west. The industrial towns sprang up first of all where suitable water



FIG. 260.—The Manchester Ship Canal.  
(From Dexter & Garlick's "Object Lessons in Geography.")

supplies were available. In general each of the coal-fields has become an industrial region, and it will be simplest to consider the coalfields in order.

The Cumberland Coalfield is but small; the principal town is Whitehaven. Good iron ore is mined and smelted at Workington.

The Lancashire Coalfield is the seat of the great cotton manufacturing industry. In the early days Lancashire manufactured woollen goods from the wool of sheep living on the Pennines. Later, when raw cotton was first sent to England, the skilful Lancashire workers turned their attention to cotton, and soon found that the damp

climate, and the abundance of soft water from the Pennines, were well suited to cotton manufacturing. This region at one time produced roughly a quarter of all the cotton goods of the whole world. Liverpool is a convenient port for receiving the raw cotton from America and the East. There are numbers of big busy towns all engaged in cotton spinning or weaving—Oldham, Bolton, Bury, Blackburn, etc. The necessary machinery is often made in the same

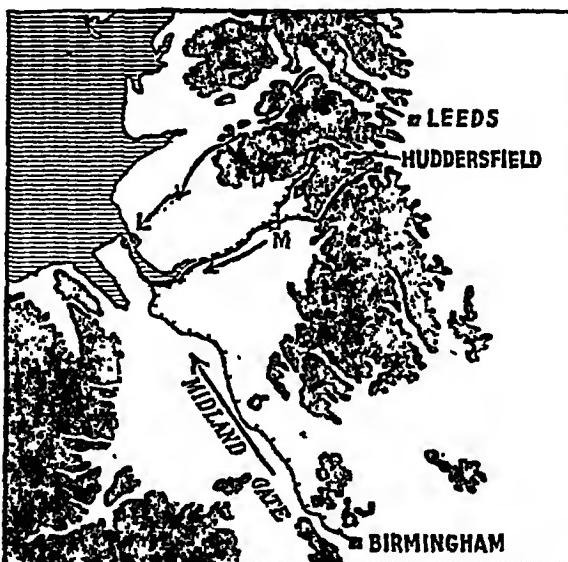


FIG. 261.—Map showing the position of Liverpool.

towns. The centre of the coal-mining industry is Wigan. The largest inland town is Manchester, now also a port because of the construction of the Manchester Ship Canal, which can be used by ocean steamers. In the south of the region (in Cheshire) salt is mined. Where salt and coal are both available glass, soap, and chemical factories have sprung up—as at St. Helens and Warrington. A considerable quantity of coal is also exported. Important towns to the north of the coalfield are Preston and

Lancaster. Some of the trade of Liverpool is taken by Birkenhead, on the opposite side of the Mersey. Birkenhead also builds and repairs ships.

The North-Eastern Coalfield (Northumberland and Durham) is one of the great iron-smelting regions of Great Britain. The ore (of low-grade quality) comes from the Cleveland Ironfield, in Yorkshire. Middlesbrough is

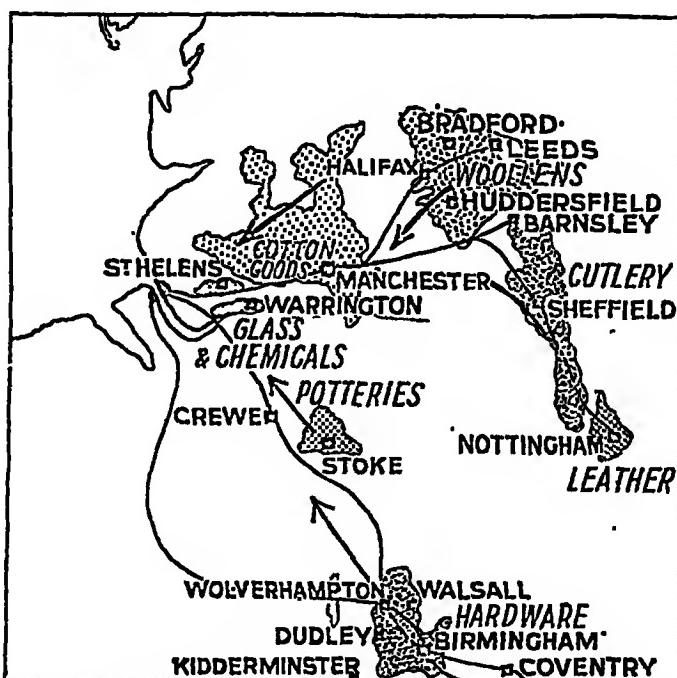


FIG. 262.—The products of the hinterland of Liverpool.

the centre of the industry. Great engineering works have sprung up at Newcastle and Gateshead, railway works at Darlington, ship-building yards at Newcastle and along the Tyne, at Stockton, Sunderland, and Hartlepool. This coalfield has the largest output of the British Isles, and large quantities are exported from Newcastle, Tynemouth, North and South Shields. There are chemical works on the Tyne and near Middlesbrough.

The Yorkshire Coalfield is the seat of woollen manufacture. As Lancashire devoted its attention to cotton, so Yorkshire with its drier climate concentrated

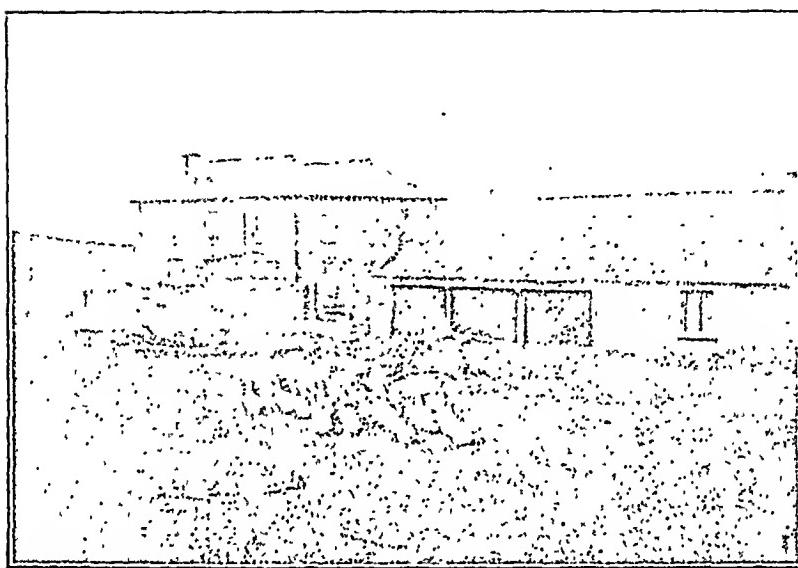


FIG. 203.—A typical English village from the air.  
[PHOTO: Central Aero Photo Co., Ltd.]

FIG. 203.—A typical English village from the air.  
Find the church with the graveyard and tombstones; the farm with farm buildings; the cottages with small gardens; the gentleman's big garden with glasshouses (to keep plants warm in the cold winter), and orchard of fruit trees.

on woollens. The wool came originally from local sheep, but is now imported from Australia, New Zealand, South Africa, and South America. The towns often specialise in

one particular kind of woollen goods, *e.g.* carpets at Halifax, worsted cloth at Bradford. The largest centres are Bradford, Huddersfield, Leeds, Halifax, and Barnsley. In the south of the coalfield is a region famous for iron and steel goods, especially around Sheffield, which is celebrated for its cutlery. Sheffield itself does not smelt iron ore, but obtains fine iron and steel from Cumberland, Middlesbrough, or Sweden. Its cutlery trade was favoured



[Photo: L. D. Stamp.]

FIG. 264.—A typical English farm.

Notice the strongly built farmhouse and the farm buildings with shelter for the ploughs and carts. In the front are ducks and pigs.

originally by the presence of a gritty sandstone used for grinding. Other towns, such as Chesterfield, smelt iron ore obtained from Lincolnshire and Northamptonshire, and make cast-iron goods.

**The Midland Coalfields.**—The smaller coalfields of the Midlands group themselves around the great town of Birmingham. A great variety of articles is manufactured,

mostly of small size, using iron and steel, copper and brass. Examples are guns and ammunition, jewellery, hardware, nails, and metal tubes. Other towns are Wolverhampton, Walsall, and Dudley. To the north-west is Stoke-on-Trent, the centre of the pottery industry; at Crewe are great railway works. To the south-west is Kidderminster with a carpet industry, and Worcester, noted for china ware; in the south-east is Coventry, where motor-cars are manufactured.

**South-Eastern England**, together with those parts of the Midlands and west which are not engaged in manufactures, is mainly agricultural. The west is wetter than the east, and dairy farming is important in the west, whilst most of the wheatlands are in the drier east. The country is not a true plain, but consists of alternating low ridges, often of limestone, and broad valleys. Much of the land on the ridges is cultivated, for the limestone soils are rich. The valleys are usually used for cattle pastures. It is this part of England where one sees the land divided into tiny fields, separated by hedges. Mixed farming is practised. Each farmer grows a number of different crops, and usually keeps a few cattle, sheep, pigs, and horses—the horses for ploughing. The land is carefully manured, and rotation of crops is practised. Thus the English farmer gets thirty or forty bushels of



FIG. 265.—Agriculture in England and Wales.

Most important in the Midlands south and east, where the land is not too hilly.

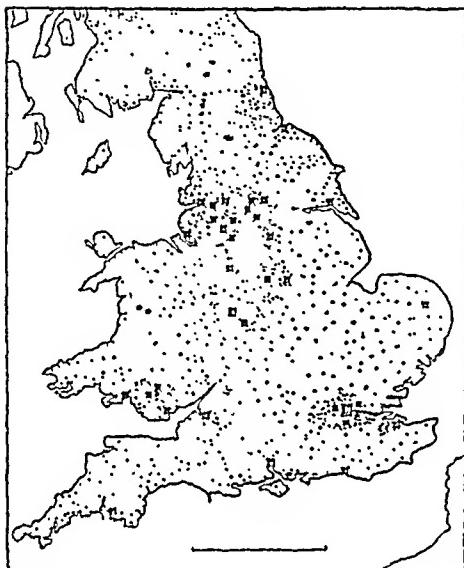
wheat from one acre of land. In India, even on the best irrigated land, twenty bushels per acre is a good crop, and in Canada or the Argentine the yield is only ten to twelve bushels. Kent is famous for its fruit orchards. Although none of the land is wasted, there is only room for a small number of cultivators. Only four people out of every

hundred in England depend on the land for their living. In India the population is densest in the best agricultural regions; in England the dense population is in the industrial regions. This is shown in Figs. 265 and 266. Many of the towns are market towns, where cattle and sheep are bought and sold on "market days"—just like bazaar days in India. A few small manufacturing towns exist, most of which have arisen to work local products. Thus Northampton makes boots and shoes—originally all local cowhides were used.

FIG. 266.—Population in England and Wales.

Population is greatest in the coalfield and industrial regions and least in the agricultural regions. This shows that England is an industrial country.

Norwich manufactures agricultural implements, originally for local use. It is curious that in the heart of this agricultural region of England we find London, the greatest city in the world. Two thousand years ago London was built on the spot where the Thames could be crossed, and it still remains a bridge town—the lowest point where the Thames has been crossed by a bridge. It was near the rich and important parts of the Continent; from London all parts



of England could be easily reached. So it has grown gradually to a huge international trade centre. Yet London has no coal, no iron, no water-power, no outstanding manufactures, and its docks have been built at great expense. It has become the railway centre for the British Isles. Round the coast of southern and eastern England are a number of ports engaged in Continental trade—Folkestone, Dover, Harwich, and Hull.

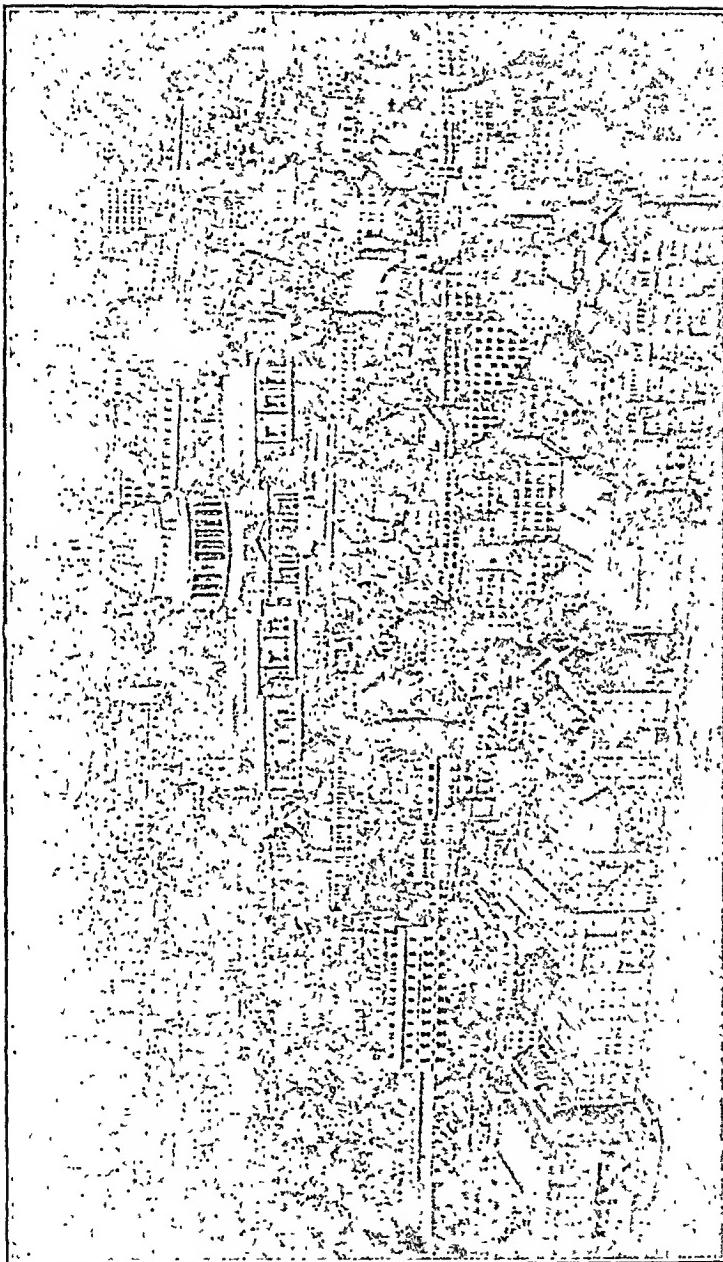


[Photo: L. D. Stamp.]

FIG. 267.—A typical English cottage.

An old cottage in which the farm worker and his family live. The cottage has four rooms, each with a place for a fire for use in the winter. Notice the farm labourer's daughter at the door.

Southampton has fine docks and the advantages of a double tide and nearness to London, and has become the great port for Trans-Atlantic liners. Grimsby is the fishing port for the North Sea Fisheries. In the west of England is the old port of Bristol, once the chief port for the West Indian Trade.



[Photo: *Surrey Flying Services, Ltd.*

FIG. 268.—An aerial view of part of London.

The big building in the centre is St. Paul's Cathedral. In the front is the River Thames and many warehouses. Compare this with the aerial views of New York and Sydney.

### COMMUNICATIONS OF GREAT BRITAIN

Great Britain is served by a magnificent series of railways which radiate from London. Nearly all the lines are double lines, and large numbers of trains run daily. England has some of the fastest trains in the world, with an average speed of sixty miles an hour. The fastest Indian trains do not average more than thirty-five or forty miles an hour. Great Britain is only one-twentieth the size of India, but has 20,000 miles of railway—more than all the

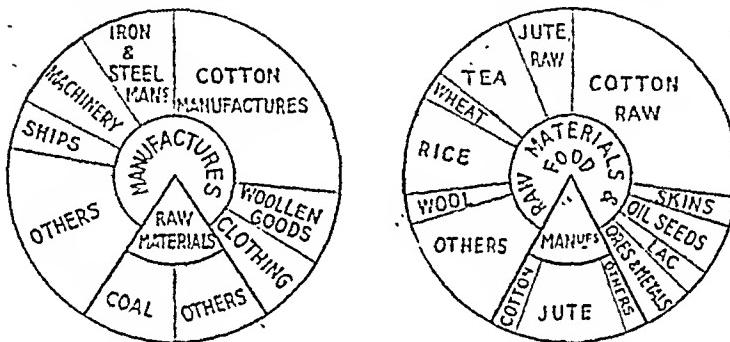


FIG. 269.—The exports of England and India compared.

The exports of England are nearly all manufactured goods; the exports of India are nearly all agricultural products.

broad-gauge railways of India. Over the Midlands of England there are some canals for barge traffic, but they are not very important. The Manchester Ship Canal is the most important of all. All the roads in Great Britain are metalled. Roads are everywhere.

### NORTHERN IRELAND

consists of the fertile soil derived from the weathering of basalt in the east; but poor soils are the rule farther west. In the wetter parts pig rearing and cattle farming

are carried on. On the rich arable lands oats and flax are the principal crops. The flax has given rise to the linen industry of Belfast, but much imported flax is now used. Ireland has no large coal or iron field, but Belfast is an important shipbuilding centre, the iron and steel being readily available from Cumberland and coal from Scotland. Another town of importance is Londonderry.

#### COMPARISON OF TRADE, 1924.

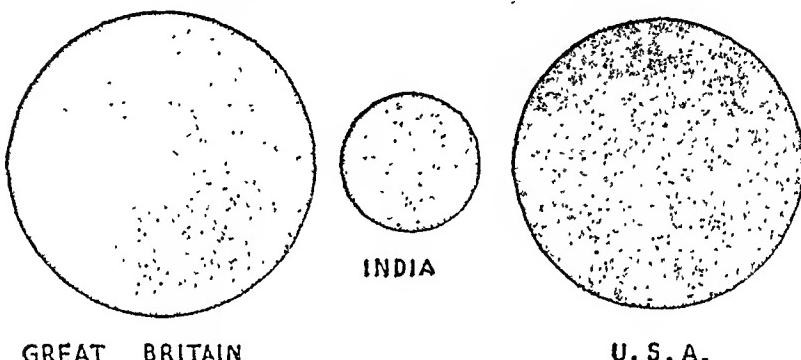


FIG. 270.—The comparative value of the trade of India and Great Britain.

Although Great Britain is so small, when compared with India, notice the enormous value of the foreign trade.

#### THE TRADE OF GREAT BRITAIN AND NORTHERN IRELAND

Great Britain is essentially an industrial country, and all its great exports, except coal, are manufactures (see Fig. 269). But the small country cannot grow enough food to feed her great industrial population, and much wheat is imported from Canada, Argentine, and India, as well as meat from the Argentine. This is exactly the reverse of India. Raw materials for Great Britain's industries are received from all parts of the world—cotton from United States of America, wool from Australia and South Africa, etc. Study the diagrams carefully.

## THE IRISH FREE STATE

The Irish Free State comprises the greater part of Ireland, except the north-east. Its area is about the same as that of Ceylon, but the population is smaller. The Irish Free State comprises the Central Plain and the surrounding rim of mountains.

### THE CENTRAL PLAIN

or valley of the Shannon, is low-lying, and large areas are occupied by bogs. The principal crop is potatoes, and much of the area is covered with grass on which large numbers of cattle are reared.

### THE MOUNTAIN RIM

is breached in the east, where lies the city of Dublin. Dublin is noted for brewing and distilling and for minor manufactures. In the sheltered valleys of the mountain rim much barley is grown; cattle are kept for milk and butter, Cork being the great centre of export.

Ireland is less developed than other parts of the British Isles. Cattle are exported, but Ireland has to import grain to feed the people.

## THE BRITISH EMPIRE

The British Empire, better called the British Commonwealth of Nations, is the largest Empire the world has ever known. It covers more than one-fifth of the whole of the land surface of the globe and has more than one-quarter of the world's people.

The British Empire consists of :

- (a) Great Britain and Northern Ireland.
- (b) India.

(c) The Crown Colonies, which are ruled by Governors appointed in London and controlled by the British Parliament through the "Colonial Office." Examples are Ceylon and the Straits Settlements.

(d) The Self-governing Dominions and Colonies which have their own parliaments and practically govern themselves. Examples are Canada, Australia, and New Zealand.

Some parts of the British Empire were obtained by conquest (*e.g.* Canada); other parts by discovery (Australia); many areas have been added at the request of the inhabitants who desired good rule (Kenya and many colonies in Africa); small parts by purchase or exchange (Hong Kong).

The important thing to notice about the British Empire is the way in which all parts can work together for the common good. Some parts supply food, other parts manufactured goods, whilst many of the smaller possessions act as "policemen" guarding the great trade routes.

#### QUESTIONS AND EXERCISES

1. State fully why so many of the people in the British Isles are engaged in fishing.
2. Compare and contrast the importance of the Thames to England and the Ganges to India.
3. How has the discovery of coal and iron in Great Britain affected her national life?
4. Japan has often been called the "British Isles of the East." How far is this true?
5. Cyclones occur in both Europe and Asia. How do they affect the climate of each of the continents, and how do these effects differ from one another?
6. Which of the natural regions of Scotland would you choose to live in, and why?
7. Describe and account for the chief industries on (a) the Lancashire, (b) the Yorkshire, (c) the Northumberland, (d) the South Wales coal-fields.
8. Write a description of the physical features, geology, and products of the Weald.
9. What are the advantages of the position of Great Britain for (a) European, and (b) world trade?
10. What geographical reasons can you give for the small population and lack of development in Ireland?

## SCANDINAVIA

The large peninsula of Scandinavia is divided between two countries, Norway and Sweden. Although Scandinavia is a peninsula and Great Britain an island, there are many points of resemblance between them. The western coast is extremely indented and fringed by numerous islands (compare Scotland). The inlets are termed "fiords," they are often deep and with vertical cliffs rising directly out of the water. They are believed by some to have originated from cracks in the earth's crust. A great ridge of mountains runs along the Scandinavian Peninsula near the west coast. It consists of old hard rocks of the same type and age as those of the Highlands of Scotland. To the south-east of the mountain ridge, the land slopes gently down towards the Baltic Sea. Naturally the longer rivers flow towards the east (compare England). But the mountains of Scandinavia are much higher than those of Great Britain. The rivers, flowing swiftly down from great heights, can be "harnessed" and made to generate electric power; the rivers of Sweden can be used for floating timber.

The western coasts of the peninsula are bathed by the warm waters from the North Atlantic Drift, and so the climate is comparatively mild. Although the North Cape is nearly five degrees inside the Arctic Circle, and the most northerly point in Europe, the sea there is never frozen. The mountains of Scandinavia attract a heavy rainfall. The country west of the mountain divide is Norway, the country to the east is Sweden.

Sweden lies in the rain-shadow of the mountains and so is much drier than Norway. It is also cut off by the mountains from the effects of the warm currents, and so has a climate of extremes, getting very cold in the winter. A great part of the Scandinavian Peninsula is forested, being covered with coniferous forests.

Norway is larger than the whole of Bombay Presidency,

but it only has about as many people as the cities of Bombay and Calcutta together. The only lands which can be used



FIG. 271.—Scandinavia and Denmark.

for cultivation are narrow strips round the fiords, or some narrow valleys, especially the Glommen Valley. The

wealth of the country comes from the forests and the fisheries. The exports are timber, wood-pulp, and paper; fish and fish-oil and minerals. Norway has no coal, and so has developed its "white coal" resources—that is, hydro-electric power from swift streams. The Norwegians, with the sheltered waters of the fjords as a training ground, have always been brave seamen. Many of them have sailed abroad and settled in new lands, and Norway has still a large merchant navy.

*Oslo* (formerly called *Christiania*) is the capital and largest town, exporting timber, wood-pulp, etc.

*Bergen*, on the west coast, exports timber, and is a centre of fishing industries. Near by is the fishing port of *Stavanger*. *Trondhjem*, farther north, is the third port. Railway construction in a mountainous country like Norway is difficult, and there are only railways in the south of the country, except at *Narvik*. The principal lines connect Oslo with Trondhjem and with Bergen.

To the north of Norway lie the Arctic Islands of Spitsbergen and Bear Island. These may become important owing to the occurrence of coal. They form the only foreign possessions of Norway.

Sweden is larger than Norway, and has more than twice as many people. The southern part of Sweden forms part of the great European Plain. It is covered with glacial deposits, and there are numerous large lakes of glacial origin. The northern half of the country is forested. So far the most important exports are timber, wood-pulp, and paper. But Southern Sweden is an agricultural country. It suffers from great extremes of temperature and is almost too cold for wheat. The leading crops are oats and rye, but large quantities of hay and fodder are grown for feeding cattle. The industries of Sweden have grown up gradually as a result of the exploitation of natural resources. There are saw-mill towns all down the shores of the Gulf of Bothnia; pig-iron is produced in several districts, and electrical machinery is made. An important industry is the making of matches.

*Stockholm* is the capital, and has iron industries. *Gothenburg* is the chief port of Sweden. *Malmo* is the train ferry station opposite Denmark. The port of *Narvik* in Northern Norway is connected by railway with *Gellivara*, one of the rich iron regions.

*Norrkoping* has textile works. The saw-mill towns as well as Stockholm suffer from being ice-bound for many months of the year.

Sweden is fairly supplied with railways, and has

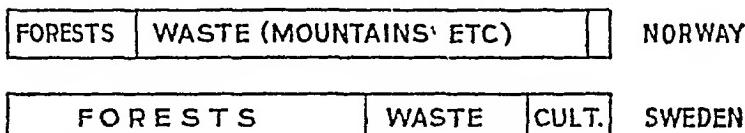


FIG. 272.—Uses to which land is put in Norway and Sweden.

Notice the very small area of cultivated land in Norway.

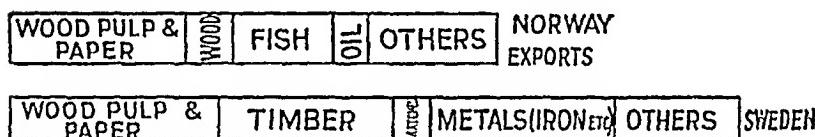


FIG. 273.—Exports of Norway and Sweden.

numerous canals. The most important canal system is that which connects lakes Vener and Vetter with the Baltic Sea.

Study Figs. 272 and 273 carefully for the occupations and trade of Norway and Sweden.

#### QUESTIONS AND EXERCISES

1. Compare and contrast Norway and Sweden as regards physical features, climate, population, and occupation.
2. Explain fully why the Norwegians have a large fleet of merchant vessels.
3. Compare and contrast, with sketch-maps, Scandinavia and the British Isles.
4. Draw a sketch-map to show the communications of Scandinavia. Indicate ports or routes which are closed in the winter.

## THE BALTIC STATES

Sweden lies on the west of the Baltic Sea. Along the east coast of the Baltic Sea are four small republics, which are usually known as the "Baltic States." Before the Great War of 1914-1918 they formed part of the Russian Empire, but since the war they have been independent.

The eastern side of the Baltic Sea is part of the great European Plain, and the land is everywhere flat. In most places it is thickly covered by glacial sands and clays, left behind when the Ice Sheet of North Europe melted. The northern part (Finland) consists of a mass of old hard rocks in which the ice sheet scooped out many hollows, now occupied by lakes.

You will remember that as we go eastwards in Europe the climate becomes more and more continental. In the Baltic States the winters are very severe. Ice forms over the sea and blocks the ports for part of the year, those in the north being blocked for the longest period.

Finland is the largest of the new republics, and occupies the land north of the Gulf of Finland. Like Sweden on the other side of the Gulf of Bothnia, it is covered with coniferous forests. Timber, wood-pulp, and paper form 85 per cent. of the exports of Finland. The principal town and port is *Helsingfors*, or *Helsinki*. Another port is *Abo* (Turku). The numerous lakes are linked by canals. In the north of Finland is Lapland, inhabited by nomadic Lapps, who depend for their existence on their herds of reindeer.

Estonia lies to the south of the Gulf of Finland. Notice that Finland and Estonia, between them, have complete control over the entrance to Leningrad and Northern Russia. Nearly a quarter of the land is forested, but nearly all the remainder is cultivated, or used for pasture. The climate is too severe for wheat. Rye, oats, barley, and potatoes form the principal food crops.

Flax is grown and exported, but the principal exports are timber and paper. The principal town is *Tallinn* (*Reval*).

Latvia occupies the land round the Gulf of Riga. The important town and port of *Riga*, on the Western Dwina, used to be one of the main outlets for Northern Russia. Much of the produce of Russia must still pass through Riga. The railways of Russia are not of the same size as those of Western Europe, but from Riga one can go right to France or Holland without changing trains. Unfortunately Riga, being in a gulf, is blocked by ice for many months of the year, but the other ports, *Ventspils* (*Windau*) and *Libau*, are open nearly the whole year. The crops of Latvia are similar to those of Estonia ; timber and flax are the staple exports.

Lithuania is larger than Latvia, but has a very short coast-line with one port, *Memel*. The principal town is *Kaunas* (*Kovno*). The crops are as in Latvia ; dairy produce is exported in addition to timber and flax.

## POLAND

The old kingdom of Poland has again become independent as a republic. It was once an important country of Europe, but before the Great War was occupied partly by Germany, partly by Russia. Poland is an example of a state with no natural or geographical boundaries. It consists almost entirely of flat land, and fades eastwards into Russian territory, westwards into Germany. But the Poles are very proud of their nationality, and are determined to secure prosperity for their country once more. Running through the centre is the great highway, the River Vistula. The natural outlet for Poland is the port of Dantzig. But the most numerous inhabitants of Dantzig are the Germans. So Dantzig has been made a free city, open to all nations equally.

Poland is considerably larger than Bombay Presidency, and has considerably more people. It falls into two parts :

(a) The northern part, the plain of the Vistula, which belongs to the Great European Plain.



FIG. 274.—Poland.

Notice the absence of natural barriers, the position of the Silesian coalfield and Dantzig.

(b) The southern part, or Galicia, comprising the slopes of the Carpathians.

Notice that Poland is a very long way from the influence of the Atlantic Ocean, and so suffers from a continental

climate with severe winters. The rivers are frozen for several months of the year.

Northern Poland, or the Plain of the Vistula, is essentially an agricultural country. Large areas are forested, and there are extensive districts occupied by useless marshes, especially near the eastern borders (Pripyet Marshes) and western borders (Posen Marshes) of the country. Just as in the Baltic States, the climate is a little too severe for wheat, and again the principal crops are rye, oats, barley, and potatoes. A large quantity of sugar-beet is grown, also flax. There are seven million cows (one for every four inhabitants) and nearly as many pigs. The centre of this region is the capital, *Warszawa*, or Warsaw, on the Vistula. Warsaw is well placed in the centre of the country, just where the banks of the Vistula are higher and not liable to floods. It is a railway centre, and controls the routes between Germany and Russia. It has developed important iron, steel, leather, and textile industries. The natural outlet is down the Vistula, through Dantzig. But Poland is busily building her own port at Gdynia. *Lodz* (cotton manufactures) and *Lublin* are two centres south of Warsaw. There are sugar factories and saw-mills in various parts of the plain.

Southern Poland, or Galicia, comprises the forest-clad slopes of the Carpathians. The most important part is in the south-west, which includes a portion of the Silesian coal and iron fields. *Krakow* is the largest town. Farther east are rich oilfields and salt-mines which are said to be inexhaustible. The centre for this region is *Lwow* (Lemberg).

**Trade of Poland.**—Poland exports timber, wood-pulp and paper, sugar and mineral oil. The bulk of the trade is with Germany, but the timber is exported, *via* Dantzig, largely to Great Britain. *Dantzig* has been made a free city under the control of the League of Nations. It is the natural port of Poland, but most of the inhabitants are Germans, so the present arrangement was made to settle the rival claims of Germany and Poland.

**QUESTIONS AND EXERCISES**

1. Draw sketch-maps to show the importance of the position of (a) Riga, (b) Memel, (c) Danzig.
2. "Poland is a state with no natural boundaries." Explain fully how far this is true.
3. Compare and contrast the climate of Poland and the British Isles.

**GERMANY**

Since 1918 Germany has been a republic. Before the Great War of 1914-1918 Germany was an Empire, ruled by the Kaiser, and had large colonial possessions, especially in Africa. Germany has now lost all her colonies, whilst roughly 30,000 square miles of the territory in Europe has been given to France, Belgium, Denmark, Poland, and Czechoslovakia. Even now Germany is a large and prosperous country, with a big population. It is as large as Madras and Mysore together and has more people.

**Physical Features.**—Germany falls into two main divisions :

- (a) The North German Plain, part of the great European Plain, covered by a thick mantle of glacial clays and sands.
- (b) The Central Highlands and Alpine Foreland, a varied mass of hills and low mountains occupying the southern half of the country and sloping upwards on the whole southwards to the Alps.

Nearly all the rivers of Germany flow northwards ; some (the Oder) to the enclosed Baltic Sea ; others (the Elbe, Weser, and Rhine) to the North Sea. The Elbe is a valuable river, but the finest of all is the Rhine. Unfortunately for Germany, the Rhine enters the sea through Holland.

**Climate.**—The German climate is intermediate between the oceanic climate of North-West Europe and the continental climate of Poland and Russia. As one goes from west to east the winters become colder and the summers warmer.

**Vegetation.**—The higher hills and mountains are clothed with valuable coniferous forests. The natural vegetation of the remainder of Germany is temperate deciduous forest, but man has cut down the forest over the greater part, and instead are pastures or agricultural lands.

The North German Plain is essentially an agricultural region. In many places the soil is dry and sandy, but has



FIG. 275.—The rivers of Germany.

been carefully cultivated; in other places marshes and bogs have been drained, so that now more than half the plain is cultivated, a quarter used for cattle grazing, and most of the remainder is woodland. The most important grain is rye, next comes oats, but wheat will only grow in a few places where the soil is richer. Large areas are used for potatoes (from which alcohol is made) and sugar-beet. Germany produces more beet sugar than any other country.

Berlin, the capital of Germany, lies in the heart of this

region ; from it all parts are easily reached by rail. On the Baltic Sea is the port of *Stettin*, engaged in shipbuilding. The Baltic seaports suffer from being frozen in the winter. Along the coast, too, are shallow lagoons called hafns, into which large vessels cannot enter. On the North Sea coast, notice the position of *Hamburg*, the largest port of Germany, and of *Bremen*, also a port. Germany buys much jute from India ; it is sent to Hamburg, where there

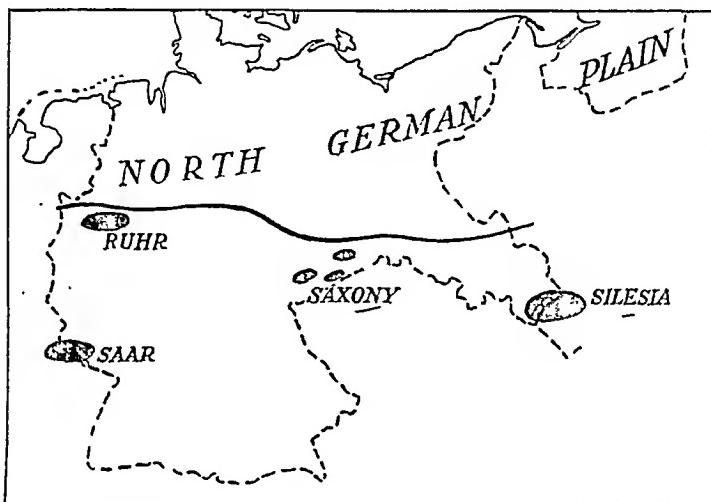


FIG. 276.—The twofold division and the coalfields of Germany.

are jute mills. Next to Great Britain, Japan, and the United States, Germany is India's biggest customer. Other important centres in this region are *Hanover*, *Leipzig*, and *Breslau*; the last two are both on the borders of Southern Germany.

**Southern and Central Germany** is a very varied region. There are several rich and large coalfields, notably those of the Saar Basin, Ruhr (Westphalia), Saxony, and Silesia. The main industrial regions are centred on or round the coalfields.

The Saar Basin is at present controlled by France, and it is to be decided in 1935 whether it shall form part of France or Germany.

The Ruhr is a tributary of the Rhine, and round the Ruhr coalfield centres the rich industrial region of the Lower Rhine and Westphalia. There are large iron and steel works, some of the iron ore being obtained at Siegen near by. But Germany has lost her best deposits of iron ore ; they are situated in Lorraine and now lie in France, and Germany has to obtain the ore from France or Sweden. Essen is one of the great iron and steel towns. Nearly half of the cotton goods of Germany are manufactured in this region, especially at Elberfeld, Düsseldorf, and Barmen ; silk and velvets at Crefeld. The manufacture of chemicals is also carried on. To the south of the region, occupying an important position as a bridge town on the Rhine, is Cologne.

Saxony has not only a field of bituminous coal, but large deposits of brown coal. Near by are the Ore Mountains (Erzgebirge), but the production of iron, silver, and zinc is now very small. The region has now a big cotton and woollen industry, centred at Chemnitz and Zwickau. Some of the finest wool, though only in small quantity, is obtained from the local sheep. Dresden has long been famous for porcelain and china.

Silesia has one of the largest and richest coalfields of Europe. Near by are very rich deposits of lead and zinc ore, and there is iron ore at Oppeln. More than half the industrial region now forms part of Poland.

The Upper Rhine Valley and Southern Germany are warmer than the more northern lands. In many parts the vine can be grown and wine is made. Dairy farming is also carried on, whilst wheat and barley take the place of rye. Munich is celebrated for beer (hops are grown in the neighbourhood) ; Nürnberg is an example of a town, not well situated on a river or coalfield, which has developed important industries in the manufacture of small articles such as instruments, glassware, and toys. In the Main

Valley, on a tributary of the Rhine, lies *Frankfort* with large chemical works. The upper part of the Rhine Valley is a narrow one, with forested hills on either side. Between Coblenz and *Cologne* is the Rhine Gorge.

IMPORTS 1913
EXPORTS 1913
IMPORTS 1924
EXPORTS 1924

FIG. 277.—Effect of the Great War (1914–1918) on the foreign trade of Germany.

The Trade of Germany.—Hamburg is by far the most important port of Germany. All the North Sea coast is shallow and the river mouths suffer from sand-

FOOD	RAW MAT.	IRON & STEEL	MACHINERY	COTTON GOODS	WOOLLEN CLOTHES	CHEMICALS	LEATHER	GLASS	TOYS	OTHERS
MANUFACTURES										

FIG. 278.—The exports of Germany—mainly manufactured goods.

FOOD	COTTON	WOOL	JUTE	SKINS	ORES	OTHERS	COAL	MANUFACTURES
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FIG. 279.—The imports of Germany—mainly food and raw materials.

banks. Both Hamburg and Bremen are kept free from sand at considerable expense, and many large vessels use the “outports,” or small ports, at the mouth of the river. Cuxhaven is the outport of Hamburg, and Bremerhaven ..

the outport of Bremen. The Baltic Sea ports have been brought into easy communication with the North Sea through the famous Kiel Canal.

The trade of Germany has suffered greatly from the war. This is shown in Fig. 277.

Figs. 278 and 279 show the principal important exports.

Germany is well served by an excellent system of railways.

#### QUESTIONS AND EXERCISES

1. Show by sketch-maps the losses of territory suffered by Germany after the Great War (use your atlas here).
2. Draw a sketch-map of Germany to show communications.
3. Take each of the great industrial regions, draw a sketch-map of it, show how the raw materials reach the region and how the manufactured goods are sent away.
4. Describe a journey by train from Riga to Holland.

#### DENMARK

Denmark is a very small country, only about half the size of Mysore. It consists of the low peninsula of Jutland and a group of islands in the Baltic Sea. The whole land is very flat, and there is no hill more than a few hundred feet high. Much of the western coast of the peninsula is waste land ; it is covered by sand dunes thrown up by the sea. Forests have been planted to prevent the sand from blowing inland. The rest of the land is very carefully cultivated, and although the country is so small, there are more than 3,000,000 people, and the crops produced are of very good quality. There are nearly as many cows in Denmark as there are people, and nearly as many pigs, as well as 20,000,000 hens. So the principal products are butter, cheese, bacon, and eggs. Although the country is so small and has no minerals, no coal, no water power, and only a poor soil, it is rich and prosperous because of the

care with which the people work the land. There are many factories, but they are nearly all connected with agricultural products—there are factories for making butter and cheese, sugar from sugar-beet, beer from oats and barley, and margarine. There are good fishing grounds on the shallow west coast, and young fish are hatched in the “Lim Fiord.” The fishing centre and west coast port is *Esbjerg*. The principal town and port is *Copenhagen*, with half a million people. Notice the position of Copen-

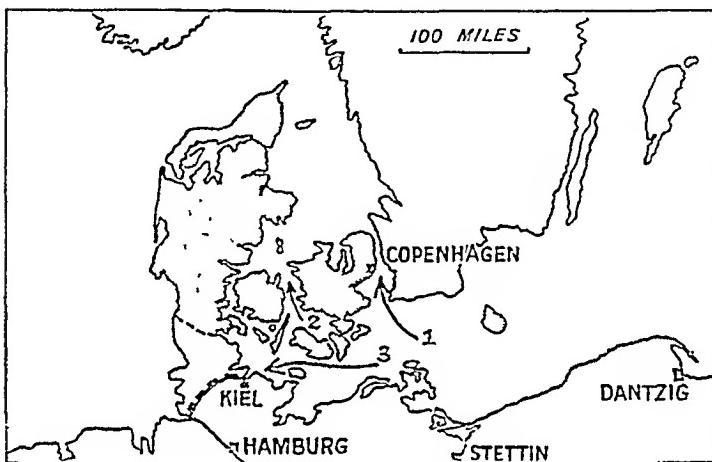


FIG. 280.—The Kiel Canal.

hagen and how Denmark controls the narrow entrances to the Baltic Sea.

The Faeroe Islands (“Sheep Islands”) belong to Denmark, as well as the great plateau of Greenland. Iceland is an independent kingdom under the same king.

Iceland is a mountainous island more than twice the size of Denmark, largely covered with snow and ice. The southern coast is a little warmer and the people rear cattle, sheep, and ponies. The only town is Reykjavik.

Greenland is a very high plateau, almost entirely covered by a great sheet of ice and so practically useless.

## QUESTIONS AND EXERCISES

1. Describe the climate of Denmark (look at Figs. 236-239 to do this).
2. Draw a sketch-map to show the position of Copenhagen and the way in which it guards the entrance to the Baltic Sea. How is its importance affected by the Kiel Canal?
3. More than half the exports of Denmark go to Great Britain. Why? Draw a sketch-map to show the trade routes. Great Britain sends coal, cotton goods, and woollen goods in exchange.

## THE NETHERLANDS, OR HOLLAND

Holland is a tiny country, smaller even than Orissa. It consists almost entirely of the delta of the Rhine and Meuse, with the low coastlands to the north. The country is very flat, and indeed a great part of it actually lies below sea-level. Great dykes have been built at enormous expense to keep out the sea, and every effort is made to win a little more land for the 8,000,000 inhabitants. Look at your atlas. Notice the "Zuyder Zee," a shallow sea in the north. Holland is now busily draining the Zuyder Sea and turning it into dry land. In spite of all the disadvantages, the industrious people have made Holland a rich and prosperous country. The people grow oats, rye, wheat, barley, and potatoes for their own use; another crop is sugar-beet, from which sugar is made and exported. More important is dairy farming. Butter and cheese are produced in large quantities and exported. Holland has a coalfield in the south-east (on the borders of Belgium), but many of the flour mills and factories are worked by windmills, which are turned round by the steady west winds which blow across the country. Fishing is important amongst the islands of the north. There are many large towns. *The Hague* is the capital, but *Amsterdam* and *Rotterdam* are larger. Amsterdam is the centre of the diamond trade of the world; Rotterdam is the largest port, and much of the trade coming down the Rhine Valley

passes through Holland. At Rotterdam gin is distilled from rye. Many of the products of Holland's tropical colonies are sent to Rotterdam for distribution to European countries. *Haarlem* is the centre for the bulbs and flowers

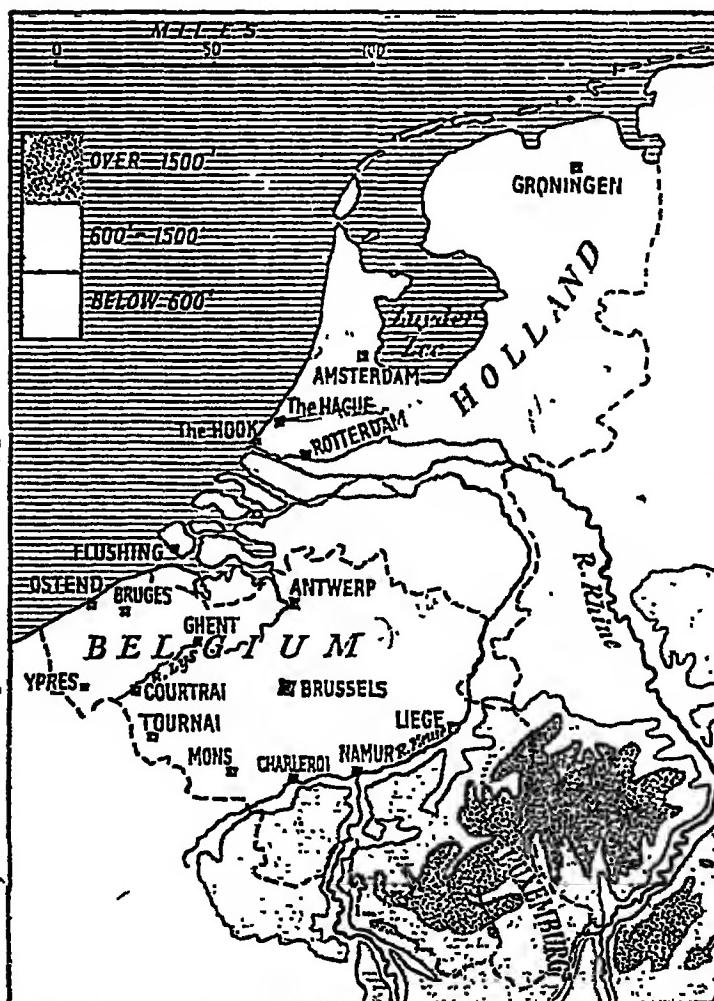


FIG. 281.—Holland and Belgium.

for which Holland is famous, whilst cloth is made from flax here also. *Utrecht* has cotton mills. *Groningen* is the centre of the north-eastern part of the country and of the butter trade. *Flushing* and *Hoek of Holland* are two small ports on the quickest route between England and Germany.

Canals and rivers are more important than roads in Holland, but there are two important railways connecting with the German railway system. The Dutch, as the people of Holland are called, are good sailors and have many ships—much of their trade is with the important colonies, the East Indies.

#### QUESTIONS AND EXERCISES

1. Explain carefully why the climate of Holland is like that of Eastern England, but the winters are colder and the summers a little warmer.
2. Draw a sketch-map to show the principal routes from London to Berlin. Which of them pass through Holland?
3. Compare Holland and Denmark.
4. The Dutch are sturdy, persevering, and obstinate. How is this shown in the development of their country?

### BELGIUM

Belgium, although a very small country, smaller than either Holland or Denmark, can be divided into three distinct regions :

(a) In the south the Ardennes form a plateau of hard rocks, partly covered with valuable pine forests and partly with sheep pastures. It is thinly peopled, but in the south, where the hills are lower, is part of the rich ironfield of Luxemburg.

(b) On the north a country of low hills, devoted to agriculture. Near the coast the land is flat. Important crops are rye, oats, wheat, potatoes, and sugar-beet from which sugar is made, and, in the low-lying tracts, flax. In

the east is dry sandy country of little use. Many cattle are also kept.

(c) Between the agricultural country of the north and the Ardennes in the south, there is a long, narrow strip



FIG. 282.—The Natural Regions of Holland and Belgium.  
The parts shown in black are below sea-level.

running right across the country from west to east, and occupied by a coalfield. This is the great manufacturing region of Belgium. Iron ores are brought from the south (Luxemburg), and there are many iron and steel works; zinc ore is obtained in the east, and is smelted near Liége.

The chief coal towns are *Mons*, *Charleroi*, *Namur*, and *Liége*. There are glass works and chemical factories at Charleroi, and railway works at Liége. This region is very thickly populated.

Belgium is, in the main, an industrial country and exports iron and steel bars, glass and glassware, cotton



FIG. 283.—Belgium the “buffer state.”

Notice the position of Belgium, with no natural boundaries, between the large and powerful countries of France and Germany. Look at the buffers on the railway carriages and see how they prevent two carriages hitting one another and being damaged. But the buffers have to be very strong. Notice the position of Holland, covering the mouth of the Rhine and so controlling the main outlet (by water) of Germany, Switzerland, and Belgium.

goods, flax and yarn and zinc, as well as billets of wood from the Ardennes.

The capital and largest city is *Brussels*, situated in a central position and well served by railways. *Antwerp* is the largest port, but can only be reached from the sea

through Holland. Like Rotterdam, Antwerp has a large transit trade in goods passing into Germany. *Ghent*, *Tournai*, and *Courtrai* are centres of the flax industry. Tournai has risen to importance because the waters of the River Lys are especially suitable for "retting" the flax. The coast of Belgium is continually being added to by the sea. Sand dunes are thrown up by the sea, and the marshland behind can be drained. Ypres, Bruges, and Ghent used to be ports, now they are far inland. It follows that the existing ports, of which the largest is *Ostend*, suffer much from being steadily silted up. Many Belgian towns were destroyed during the Great War, but, by the energy of the people, the country has quickly recovered.

Belgium is well served by railways, but notice the course of the River Meuse through the country. It is an important highway.

Luxemburg is a tiny state south of Belgium and ruled by a Grand Duke. It has valuable iron ores, which it sends to Belgium for smelting.

#### QUESTIONS AND EXERCISES

1. What is a buffer state? Why is Belgium a typical buffer state?
2. Compare and contrast Belgium and Poland as regards position, boundaries, physical features, climate, people, and productions.
3. Describe the great industrial region of Belgium.

## ✓FRANCE

With the exception of Russia, France is the largest country in Europe and one of the most important. It is favourably situated with a long coast-line opposite the coasts of England, a long coast-line facing America, as well as an important coast-line along the Mediterranean. The climate is typically Mediterranean in the south, but in the north is like that of England. As a result, the products of France are many and varied. Very roughly France can be divided into six parts:

- (a) The north and west, forming part of the Great European Plain.  
 (b) The Central Plateau.  
 (c) The Mediterranean Coastlands and Rhône Valley.  
 (d) The Alps.

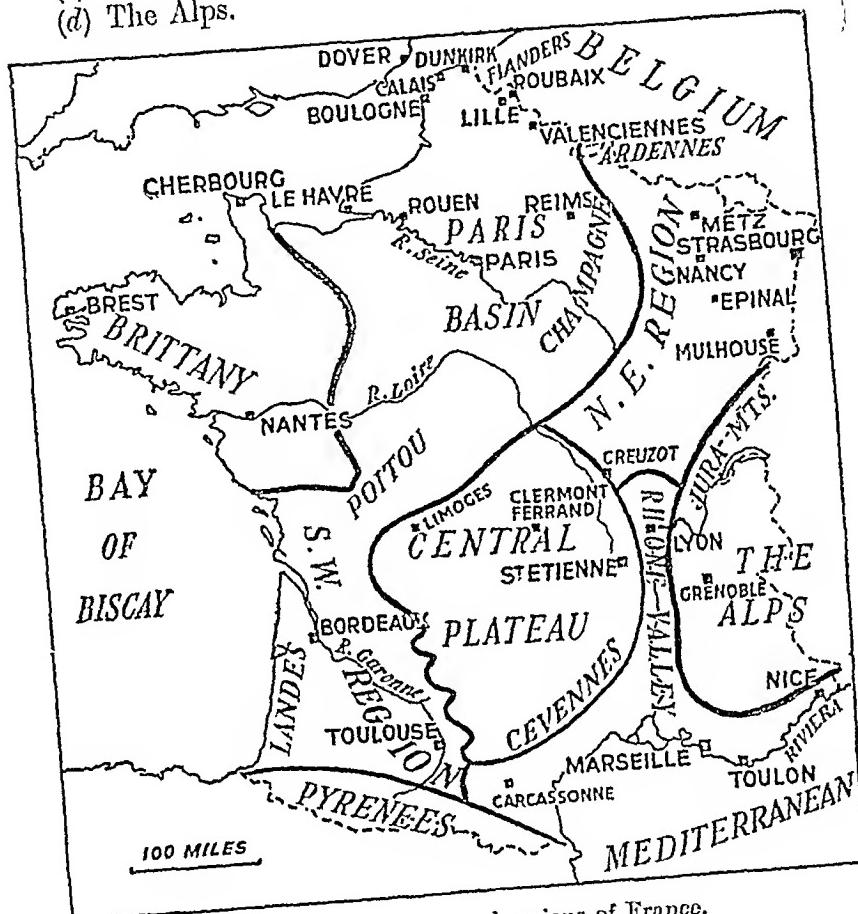


FIG. 284.—The natural regions of France.

- (e) Eastern France.  
 (f) The Slopes of the Pyrenees.  
 The North and West of France are, in many ways, like the south-east of England. In the north-west (Brittany) there is an area of old hard rocks, comparable with Devon and Cornwall in England. This part is hilly,

has a heavy rainfall, and so is a cattle region. Although the coast is indented and there are good harbours, this part has few industries except fishing. *Brest* is a naval station and *Nantes* build ships.

Farther east, as in Eastern England, the climate is drier, and the country is indeed very like the south-east of England. It is a great agricultural region, the principal crops are wheat, oats, and sugar-beet. On the dry chalk pastures many sheep are reared. Around *Réims* it is warm enough for a special small kind of vine to grow, from which champagne is made. In the north of this region, centred about *Lille*, is a continuation of the great Belgian coalfield region. This coalfield, the coalfield of Northern France, has given rise to a busy industrial region. Iron is brought from Lorraine, and there are iron, steel, and machinery works. Cotton and other textile industries flourish at *Lille*, *Roubaix*, *Valenciennes*, and other centres. Notice the ports of *Calais* and *Boulogne* facing England.

*Paris*, the great capital of France, lies in the centre of the agricultural region of Northern France. Like London, it is not near any great coal or iron field, and its industries are mostly connected with the manufacture of small articles. *Rouen* is another important town of Northern France and has cotton manufactures; *Cherbourg* and *Havre* are ports with a trade across the Atlantic.

The south-west of France is warmer, and the vine flourishes. This is the great wine-producing region of France. The industry centres round the port and principal town of *Bordeaux*. Wheat and maize flourish in this

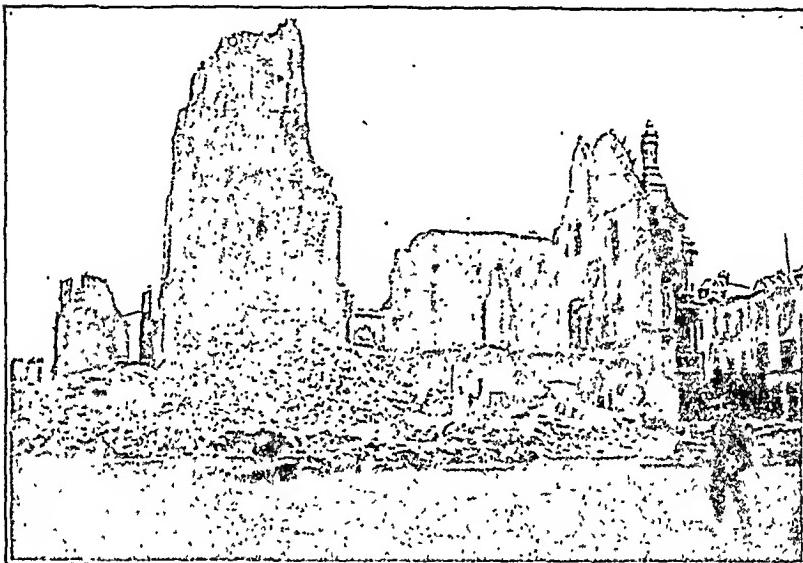


FIG. 285.—The coalfields of France.

1—the northern coalfield; 2—the Sarre coalfield; 3—the coalfields round the central plateau.

region ; cattle are reared on the wetter grasslands, whilst sheep flourish on the slopes of the Pyrenees. The Landes, on the coast, south of Bordeaux, are an area of sand dunes. The sand threatened to blow over the fertile lands to the west and to destroy them, but forests of pines and oaks have been planted and the sands are thus prevented from blowing about.

The Central Plateau is a region of old hard rocks yielding a very poor soil. The region attracts a heavy



[Photo : L. D. Stamp.

FIG. 286.—What war does to cities—the principal building of a town in Northern France (Arras) after the Great War.

rainfall, but the soil is so poor that the principal crop is rye, and the grasslands are only good enough for sheep. Around the old rocks lie a number of coal basins, the most important being round *St. Etienne*. A little iron ore is found and *St. Etienne* makes good steel.

The Mediterranean Coastlands have a typical Mediterranean climate, but the Rhône Valley is a little colder because of the cold wind (the Mistral) which blows down

from the Alps. The olive flourishes along the coast, on soils too poor for other crops; the vine over most of the region, whilst the mulberry tree grows mainly in the Rhône Valley. Numbers of silkworms are fed on the mulberry trees, and the centre of the silk industry is *Lyon* (*Lyons*), near the St. Etienne coalfield. Much of the raw silk for the industry is now imported from China and Japan, but Lyon remains the largest silk centre of Europe. The great port of *Marseille* (*Marseilles*) is the natural outlet for the Rhône Valley. It has oil, candle, and soap factories which resulted, in the first place, from the local supplies of olive oil. But just as Lyon now imports raw silk for her silk factories, so Marseille imports linseed, sesamum, ground-nuts, and copra for her factories. A large proportion of the oil-seeds from India go to Marseille. Marseille has now a huge trade with India and the East, including the important French colony of Indo-China. The mails from India to England are transferred from the mail steamers to the French railways at Marseille and taken across France to Calais, and reach London less than twenty-four hours after arriving at Marseille. The great shipping trade of Marseille has caused the development of shipbuilding industries. East of Marseille is the naval station of *Toulon*. The Mediterranean coast near Italy, known as the Riviera, is very sheltered and has warm winters. It is used in winter as a pleasure resort for Europe; the centre is *Nice*.

**The Alps.**—The western end of the great Alpine mass

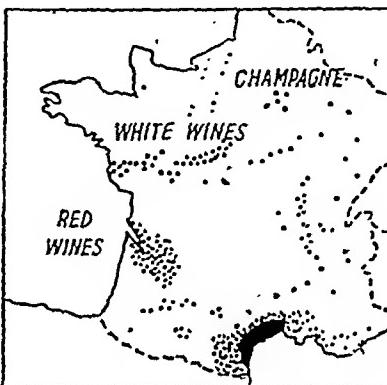


FIG. 287.—The vineyards of France.

Notice that most vineyards are found in the Mediterranean region. The northern coast is too cold for the vine and so is the central plateau.

of mountains lies in France, but is not of great importance to the country. Water power is available and is leading to the development of chemical and other industries.



Fig. 288.—The silk-producing regions of Europe.  
The most important regions are the Rhône Valley in France and the Po Valley in Italy.

France is connected by railway with Turin, in Italy, by the famous Mont Cenis tunnel.

Eastern France includes the province of Alsace-Lorraine which was lost by France in the war of 1870-71, but regained after the Great War of 1914-18. The boundary of France is now the River Rhine for a considerable distance. This region contains the enormous iron ore deposits of Lorraine. The iron ore is of low grade, like the Cleveland ores in England, but it can be worked cheaply. Much of the ore is sent by canal to the coalfield of Northern France. But France has not really enough coal of her own to work the vast de-

posits of iron ore. France has been given the Sarre (Saar) coalfield until 1935, when it is to be decided if it shall belong permanently to France or be given back to Germany. Saarbrücken is the chief town on the coal-

field. Bordering the Rhine Valley are the Vosges mountains. The streams flowing down from the Vosges were found to be very suitable for bleaching cotton, and a large cotton manufacturing industry has sprung up, with centres at *Mulhouse* and *Epinal*. Rich potash deposits (from which valuable manures for improving poor soils

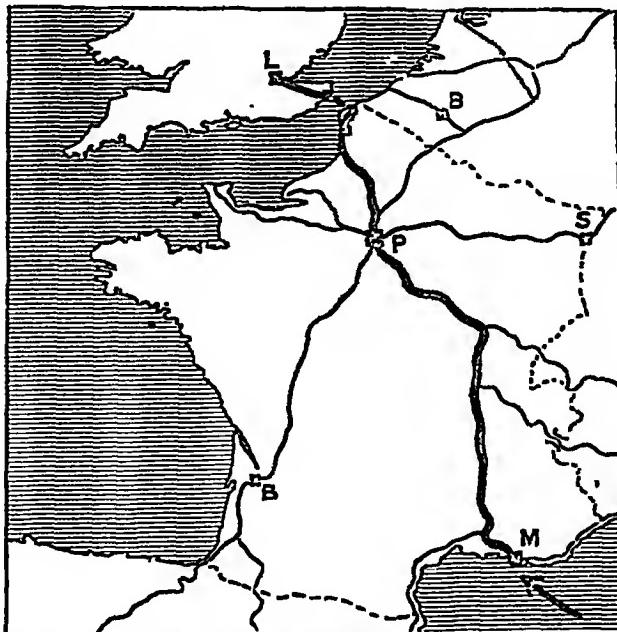


FIG. 289.—The railways of France.

The arrow and the thick black line show the route followed by the mails from India to England.

are obtained) are worked north of Mulhouse. *Metz* and *Nancy* are other large centres of this region. *Strasbourg* is a river port on the Rhine.

The Pyrenees form a great barrier between France and Spain. Railways have been built round their eastern and western ends.

**Communications of France.**—France is well served by

railways, nearly all of which radiate from Paris (compare London). Over the lowlands of the north of France are large numbers of canals, which link up the navigable rivers. The Seine, Loire, Rhône, and their principal tributaries are all navigable and connected by canals. It is thus possible to travel from the Mediterranean Sea to the

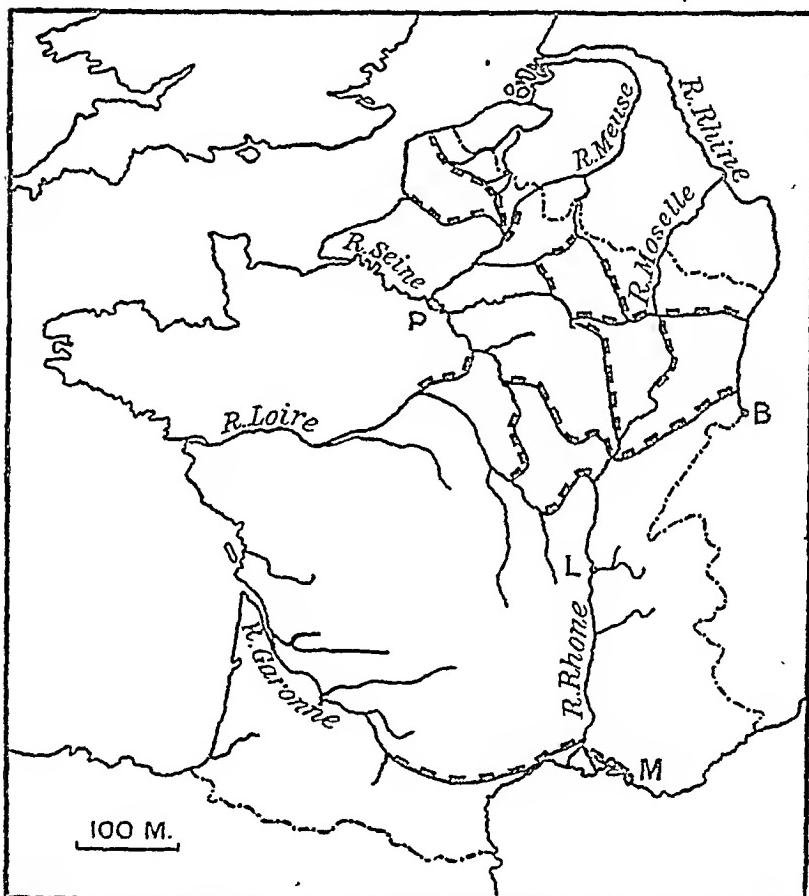


FIG. 290.—The waterways of France.

Notice how the principal navigable rivers are linked by canals.

English Channel entirely by water. Bordeaux is also linked with the Mediterranean by a canal on which lies the important town of Toulouse. France has 25,000 miles of main roads known as "national roads."

**Trade of France.**—Although France is smaller than Burma, and has a smaller population than either Bengal or Madras, the foreign trade of France is more than two and a half times that of the whole of India and Burma. Study Fig. 291 carefully for the principal exports and imports.

France is a good friend of India. Germany, Italy, and France are her best customers in Europe, and France buys

CLIMATES	SILK GOODS	COTTON GOODS	MOTORS	STEEL	OTHER MANUFACTURES		WINE	FOOD ETC.
EXPORTS								
RAW COTTON	COAL	WOOL	SILK	GRAIN	OLIVESEED	OTHER RAW MATERIALS & FOOD		MANUFACTURES
IMPORTS								

FIG. 291.—The exports and imports of France.

most of the ground-nuts and sesamum. India receives in exchange from France more goods than from any other country except Great Britain and the United States.

#### QUESTIONS AND EXERCISES

1. Compare and contrast the agriculture of England and France.
2. Draw a sketch-map of the Northern Coalfield Region, showing its main outlets.
3. What are the chief differences between the trade and position of the ports of Calais and Marseillo?
4. Write what you can of the wine industry of France.
5. Give an account of the climate of France, distinguishing between the different parts.
6. Compare the climates of France and Scandinavia.

#### SPAIN AND PORTUGAL

The Iberian Peninsula (Spain and Portugal) is roughly the same size as Burma, the largest province of India, and has roughly twice as many people. The peninsula is cut off from France and the remainder of Europe by the lofty chain of the Pyrenees. In the south, the Straits of Gibraltar between Spain and Africa are only a few miles

wide. The peninsula consists of a high plateau, called the Meseta, bounded by a line of fold mountains on the north (the Pyrenees and the Cantabrian Mountains) and also on the south (the Sierra Nevada). The plateau has been cut into deeply by a number of rivers. One river, the Ebro, flows into the Mediterranean Sea, the remainder flow into the Atlantic Ocean. The important ones are

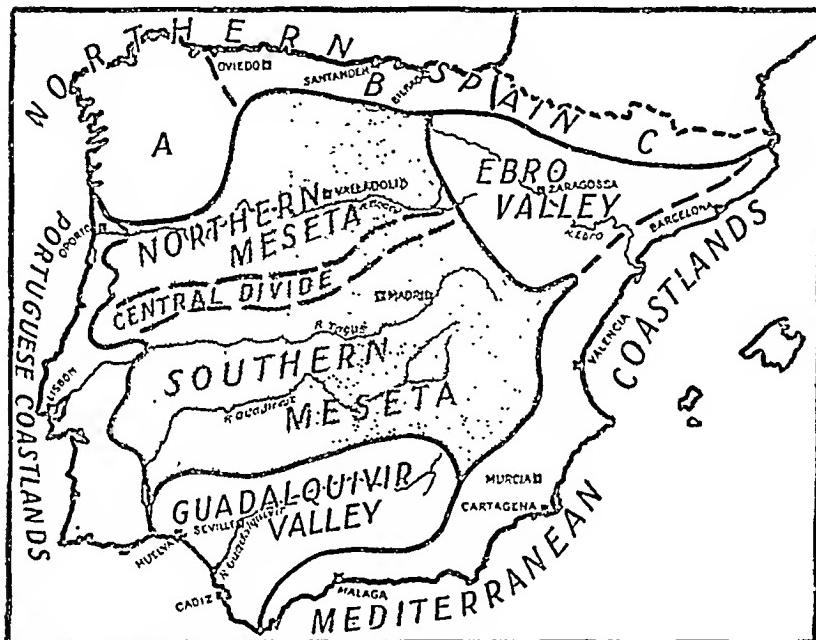


FIG. 292.—Spain and Portugal.

the Douro, Tagus, Guadiana, and Guadalquivir. The north-western and northern parts of the peninsula have a good rainfall all the year round, and belong to the climatic region of North-Western Europe. But the rest of the peninsula has a typical Mediterranean climate. The rainfall is heaviest on the western side, and it is there that the Mediterranean woodlands of cork oak flourish. The eastern coast is dry all the year, being in the rain-shadow of the Meseta.

### PORUGAL

The Republic of Portugal occupies part of the west coast. The republic includes the Azores and Madeira off the coast of Africa, and there are large colonies in Africa as well. Nearly half of Portugal is waste land, and a large part of the remainder is covered with Mediterranean oak forests. Enormous numbers of pigs live on the acorns of the oak forests. In the north, where the rainfall is heavier, the chief products are maize and cattle; on the mountains, rye, sheep, and goats; in the south, wheat, maize, and pigs. Wine is produced everywhere in large quantities, and so is olive oil; other fruits, such as figs, tomatoes, oranges and lemons, are widely grown. Most of the cultivation is on or near the coastal plains.

Along the coast fishing is carried on, and *Setubal* has a large trade in tinning sardines.

Portugal has valuable minerals but little or no coal, so the mineral deposits often remain untouched.

Portugal was once the centre of a large empire. But to-day their own country lies comparatively undeveloped, and their remaining colonies are almost untouched.

*Lisbon*, the capital, is the largest town and port.

*Oporto*, at the mouth of the Douro, is the port-wine port. Portugal supplies half the world's needs in cork, and exports also wine and fish. The imports are coal and manufactured goods.

### SPAIN (ESPAÑA)

Spain falls into several natural regions:

(a) The northern coastlands, with rain all the year round and a climate influenced by the sea.

(b) The Meseta, or central plateau, dry and with cold winters owing to its height.

(c) The Valley of the Guadalquivir and Southern Spain, sheltered and warm.

(d) The Mediterranean Coastlands.

The Mountainous North Coast stretches from the Cantabrian Mountains to the sea. It is the richest and most densely populated part of Spain. Maize grows in the valleys, the rich grasslands amongst the hills are well suited to cattle, whilst the mountains are covered with pine forests. But the great wealth of the region lies in its minerals, especially coal and iron. *Bilbao* and *Santander* both export good quality iron ore; much of it goes to Great Britain. The coalfields are round *Oviedo*.

The Meseta, or Plateau, covers the greater part of Spain. Its southern edge forms the Sierra Morena. Much is too dry or too infertile for cultivation. On the richer soils wheat is grown and milled at *Valladolid*. Large numbers of sheep are kept, and are noted for their fine wool. *Madrid*, the capital of Spain, is in the centre of the plateau, nearly in the geographical centre of the country, and so a convenient centre for government.

Southern Spain does not suffer from the cold winters of the plateau, and sub-tropical plants flourish. Oranges and lemons and the vine all flourish; the region is famous both for wine and for dried grapes, or "raisins." But the region is dry and, where possible, is irrigated. Both sugar-cane and sugar-beet are grown on irrigated land. Iron is mined in the Sierra Nevada, copper near *Huelva*; and there are other minerals. The fine old town of *Seville* is the largest in the region and, although seventy miles from the sea, the principal port. The old port of *Cadiz* is now little used. *Malaga* serves the southern slopes of the Sierra Nevada. Gibraltar, the "Key of the Mediterranean," is a British possession. Notice its position very carefully. The town is built on the eastern side of a small rocky peninsula—the Rock of Gibraltar—and has a fine harbour.

The Mediterranean Coastlands are famous for their fruits—grapes, olives, oranges, and lemons. The coastlands lie in the rain-shadow of the plateau and so are dry, but the hillsides are carefully terraced and any available river water used for irrigation. *Valencia* and *Cartagena* are fruit ports; *Murcia* is an inland centre. But more

important is Barcelona, the largest port and chief manufacturing centre of Spain. Cotton and woollen goods and machinery are made.

The Ebro Basin opens out on to the Mediterranean coast. It is colder than the coast, and the chief centre is the bridge town of Saragossa.

Spain, like Portugal, was once the centre of a great Empire, but the old colonies, including a large part of South America, have become independent. Meanwhile Spain itself is comparatively undeveloped, and until



FIG. 293.—The position of Gibraltar—the key to the Mediterranean.

recently has remained backward amongst the countries of Europe.

The Pyrenees form a very marked barrier between Spain and France. It is only with difficulty that a railway has been built round the eastern end, and another round the western end. Spain is thus greatly cut off by natural barriers from the rest of Europe, and has come more under the influence of the Moors of North Africa. Several of the cities in Southern Spain, such as Murcia, were built by the Moors.

Madrid is the natural centre of the railways of the peninsula. The principal exports of Spain are wine, fruits, metals, and ores.

## QUESTIONS AND EXERCISES

1. Draw a sketch-map of the Iberian Peninsula, showing the main physical features.
2. France and Spain are about the same size, both touch the Mediterranean and the Atlantic. Why should the foreign trade of Spain be only one-sixth that of France?
3. Compare the industries and products of the Northern and Mediterranean coasts of Spain.
4. Account for the importance of: Lisbon, Madrid, Barcelona, Bilbao, Valencia.
5. Discuss the political importance of the Pyrenees.

## ITALY

The kingdom of Italy occupies a peninsula stretching out south of the Alps into the Mediterranean. The country is shaped like a man's leg, and opposite the toe is the large island of Sicily. Running down the centre of the leg is the central "bone"—the Apennine Range. Italy is nearly as large and nearly as populous as the Madras Presidency. Italy falls into three divisions:

- (a) The southern slopes of the Alps in the north.
- (b) The great plain of Lombardy, or the Plain of the River Po.
- (c) Peninsular Italy.

Peninsular Italy has a typical Mediterranean climate—hot dry summers and warm moist winters, but the plain of Lombardy is cut off from the influence of the Mediterranean by the Apennines, and has very cold winters with most rain in spring or summer. The north of Italy suffers from the cold Bora, a wind blowing down from the mountains; the south of Italy from the hot dusty Sirocco, coming from the Sahara.

The Italian Slopes of the Alps face towards the south and towards the sun, and so are much warmer than they would otherwise be. Many of the valleys run north and south, and are blocked at the southern end, giving rise to the beautiful Italian lakes visited yearly by thousands

of tourists. In the sheltered valleys many Mediterranean fruits, including the vine and the olive, can be grown. The Alps descend abruptly to the plains, and along the



FIG. 204.—Italy.

Land over 1000 feet, dotted. The natural regions of Italy are marked 1, 2, 3.

borders are many towns using electric power obtained from the swift Alpine streams.

The Plain of the Po is the most important part of Italy, and supports nearly half the population. The

principal food crops are maize and rice. As in the Ganges Valley, there is plenty of rich alluvial flat land suitable for paddy. Italy is the only country in Europe where much rice is grown. The climate is too cold for most Mediterranean trees, but the mulberry tree flourishes and is used to feed large numbers of silkworms. There are large industrial centres, *Milan* being the largest. Milan started as a silk manufacturing town, but now has extended its industries to cotton and woollen goods. The cotton and wool have to be imported. Water power is available from the Alpine rivers, but no coal. The railways through the

Alpine tunnels converge on the plain, especially on *Turin* and *Milan*, which have developed railway workshops and a trade in machinery. The famous old town of *Venice* is the natural port and is engaged in ship-building. *Trieste* and *Fiume*, though situated in Italy, really serve as the ports of Austria, Hungary, and Yugo-Slavia. *Bologna* is a large town in the south of the plain.

Peninsular Italy is a varied region, but mainly mountainous.

The mountains are often dry and barren, and most important are the small plains. The chief grain is a hard wheat from which macaroni is made. Olives are grown, olive oil being much used by the Italians; also vines from which Chianti wine is made, figs, oranges, and lemons. The plaiting of wheat straw is carried on at *Florence*, a famous old city and ancient seat of art and learning. The island of Elba has rich deposits of iron, and near the west coast of Italy are large deposits of brown coal. *Genoa* is a large port; notice how it is situated at a gap in the mountains and has easy routes to the plain of the Po; it has shipbuilding, iron, and cotton works. *Naples* has



FIG. 295.—The ricelands of Italy.

developed cotton mills, but *Rome*, the capital of Italy, remains a wonderful old city of the past. Near Naples is the famous volcano of Vesuvius. The island of *Sicily* is famous for its fruit and silk; its largest town, *Palermo*,

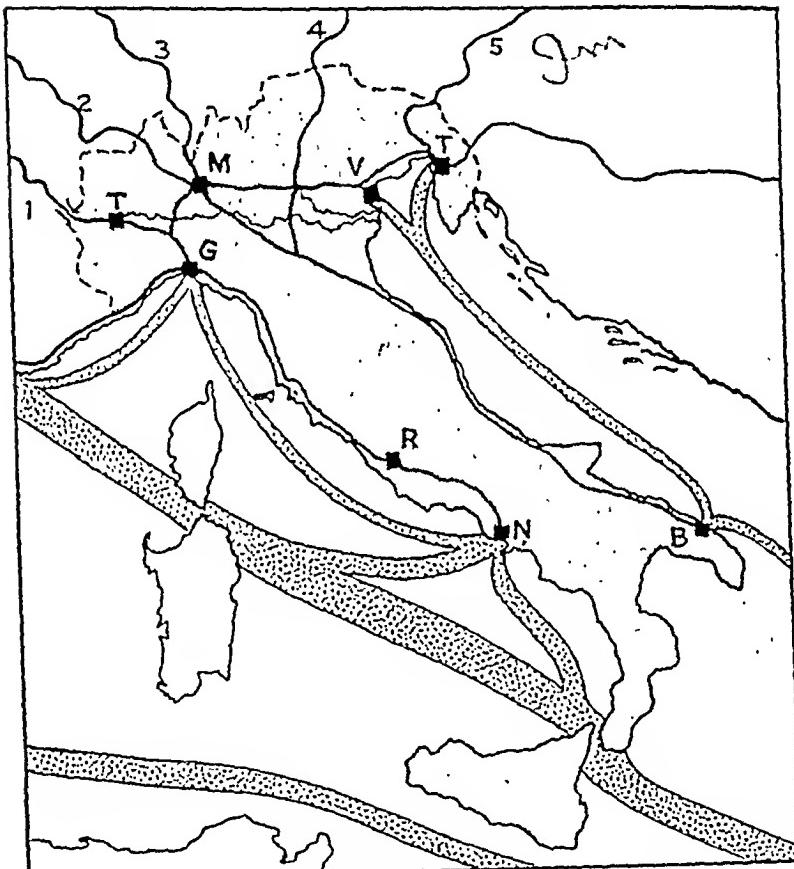


FIG. 296.—The railways and steamship routes of Italy.

Identify carefully each of the towns marked by letters and each of the railways through the Alps marked by numbers.

carries on iron smelting; *Messina* is only recently recovering from its destruction by earthquake in 1908. Sulphur from the volcanic regions is a noteworthy product. The

large island of Sardinia has rich mineral deposits, but is still undeveloped.

It is interesting to notice how the railways of Italy are controlled by the mountain chains. Study your atlas carefully and see how they converge on the plain of the Po, and how few important railways cross the Apennines.

In the south Brindisi was previously used as a port of

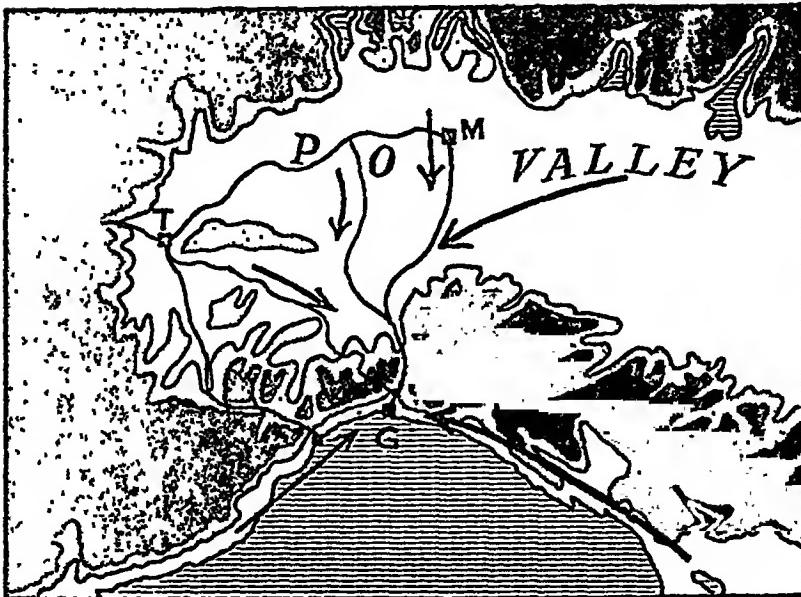


Fig. 297.—The position of Genoa.

Notice the gap to the north of the town, followed by the railway to M. (Milan). The smaller town to the west of Genoa is Savona. Notice the gap leading to T. (Turin). The arrows show the railway routes along the coasts and from the Po Valley. Land above 1500 feet, black.

call for mail steamers from the East. But this service has been discontinued and the mails are landed at Marseille in France.

The leading exports of Italy are silk and silk goods, fruits (almonds, lemons), vegetables, rubber goods, and cotton goods. Italy imports foodstuffs, raw cotton and wool and metals.

The people of Italy are, on the whole, poor, for the country is very thickly populated. Every year large numbers emigrate to France and other parts of Europe, South America, and other countries. The Italians cannot emigrate to their own colonies, for Italy's only possessions are three areas in Africa, mainly desert. These are Tripoli, Eritrea, and Somaliland.

### MALTA

Between Sicily and the nearest point of Africa lie the two islands of Malta and Gozo. Just as Gibraltar is the key to the Mediterranean, these islands are the key to the route between the eastern and western parts of the Mediterranean. They have been British since 1814. The islands are dry and rather barren, and suffer badly from the hot Sirocco wind from the Sahara. The land is very carefully cultivated by terracing and, where possible, by irrigation, but enough food cannot be grown for the quarter of a million inhabitants, and much has to be imported. The importance of the islands is in their position—on one of the great trade routes of the world. Malta has a fine harbour (at Valetta), used as a naval base.

### QUESTIONS AND EXERCISES

1. Draw sketch-maps to show the importance of the position of (a) Genoa, (b) Milan, (c) Trieste, (d) Malta.
2. Write an account of the climate of Italy.
3. Compare and contrast the Peninsula of Italy with Scandinavia.
4. Compare Italy with Spain as regards position, physical features, climate, and productions.
5. Why is the richest and most thickly populated part of Italy centred in the Po Basin? What are the chief industries?

### ALBANIA

The mountainous state of Albania, between Yugoslavia and Greece, is the wildest region in Europe. Until

1925 it had no railways, scarcely any roads; no banks and no money, and practically no foreign trade. The wild hill tribesmen provide for their own needs, and large areas of the country are waste land.

## GREECE

Greece is a mountainous country occupying the southern part of the Balkan Peninsula. It really consists of three parts :

(a) The northern portion, stretching from the Adriatic Sea, across the Balkan Peninsula and round the Aegean Sea. Along the Aegean Sea are the plains of Thessaly, Macedonia, and Thrace separated by mountain spurs.

(b) The southern portion, a peninsula with an isthmus so narrow that it has been cut across by a canal only four miles long.

(c) The archipelago and the large island of Crete.

Greece is so mountainous that only one-fifth can be cultivated. Most of the mountains are dry limestone ridges, often nearly bare, but forests cover them where conditions are better, as on the west of the main hills. The climate is typically Mediterranean, but Greece suffers from a rather low rainfall. This makes cultivation difficult, for there is little water available for irrigation. Most of the cultivation is carried on, and most of the people live, on the small tracts of alluvium. The principal grains are wheat, barley, and maize, but Greece is particularly famous for its fruit. The staple export is currants, the dried fruit of a vine with very small grapes. The greater part of the currants come from the west coast. Olives are abundant; nuts are grown in large quantity and so are figs, oranges, and lemons. Tobacco is a big export crop. There are many sheep in the northern regions and wool is produced. There are a few mineral deposits in Greece, but they are not very large. Greece is mainly an agricultural country, and the industries depend directly

on the products of the soil. The principal industries are the preparation of olive oil, wine, cheese, leather, and soap.

Greece is a country with a long and wonderful history. The Greeks were one of the leading races of the world between two and three thousand years ago, and their empire extended as far as Persia and even to India. Remains of ancient cities are scattered over the country and render it of great interest. The capital, *Athens*, has been a famous city for more than four thousand years. Mount Ida in Crete is a famous mountain in early European history, whilst the mountain of Athos, near Salonica, remains a religious colony of Christian monks even to the present day. Notice the coast-line of Greece and the reason why Greeks should be good sailors and have a large merchant navy. A notable port is *Salonica*, through which passes much of the trade of Yugo-Slavia. The ancient town of Athens has the modern port of *Piraeus* close by, with a fine natural harbour. *Patras* is the great currant port. *Candia* is the principal town of Crete.

## TURKEY

Nothing is left of Turkey in Europe except a small tract of land round the great city of Constantinople. The importance of Turkey's position, as guarding the entrance to the Black Sea, has been mentioned already.

### QUESTIONS AND EXERCISES

1. Why is Greece an agricultural country ?
2. What do you understand by Mediterranean fruits ? Take each one, describe it and say where it is grown in Europe, and for what purposes it is used.
3. Draw a sketch-map to show the importance of the position of (a) *Salonica*, (b) Constantinople.

## SWITZERLAND

Switzerland is a tiny republic situated right in the heart of the mountains of Europe. Its area is only 16,000 square miles, or two-thirds of the size of Ceylon. Although half the country is occupied by high mountains which cannot be used, the population is nearly as large as that of Ceylon. Switzerland falls into three divisions :

- (a) The southern half forms part of the main chain of the Alps and is very mountainous.
- (b) In the north is a small strip of the Jura Mountains.
- (c) Between the two lies the Swiss Plateau.

Most of the cultivated land is found in the Swiss Plateau, and there most of the people live. The country is not naturally very fertile, but the people have worked hard and have used every inch which can be used. The most important occupation is dairy farming, and Switzerland is famous for its cheese and condensed (or tinned) milk. In the warm weather the cattle live on the grass on the mountain sides ; in the cold weather, when the mountains are snow-covered, they are brought down to the valleys. The word "Alp" means a mountain pasture. Switzerland has no coal, but has developed its water power. Many of the railways have been electrified, and many of the factories are operated by electricity. Transport is expensive, and so Switzerland has specialised in the manufacture of small objects. Watches and clocks, for example, are made at *Neuchatel* and *Geneva* and in the small towns of the Jura Mountains. Similarly, fine silk goods are made at *Zurich*, *Basle*, and *Bern*. Milk is tinned at *Vevey* and many other places.

The mountains of the Alpine Zone are very beautiful, and every year huge numbers of tourists visit Switzerland from all parts of Europe. They go both in winter for winter sports, and in summer for mountain climbing. The tourists bring considerable wealth to the country and

support the large numbers of hotels. Many of the valleys which face south are warm, and rendered warmer by the Fohn winds. The Fohn winds blow down from the mountains, the air being compressed and warmed by its rapid descent.

Switzerland imports raw materials (cotton, silk, and wool) as well as metals and foodstuffs (wheat, sugar, and vegetables). The exports are manufactured goods (fine

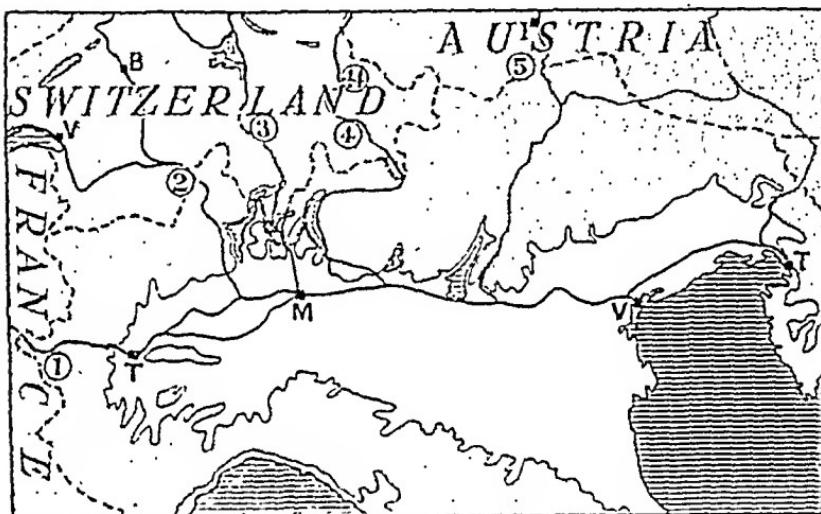


FIG. 298.—The railways through the Alps.

Land over 1000 feet, dotted. T=Turin, M=Milan, V=Venice, T=Trieste. In Switzerland, V=Vevey. B=Bern. Routes: 1=Mont Cenis, 2=Simplon  
3=St. Gotthard, 4=Bernina, 5=Brenner.

cotton and silk goods, watches and clocks, and machinery), as well as cheese and tinned milk.

Switzerland lies at the meeting point of many routes. Geneva has been made the headquarters of the League of Nations. Two important railway tunnels pass through the Alps from Switzerland—the Simplon and St. Gotthard. Two other important railway tunnels through the Alps are outside Switzerland—one to the west connects France and Italy (Mont Cenis Tunnel), the other to the east connects Austria and Italy (Brenner).

## QUESTIONS AND EXERCISES

1. Estimate the importance of the Rhine Valley to Switzerland.
2. Compare and contrast Switzerland and Kashmir.
3. By what routes does Switzerland export her goods ? Illustrate your answer by a sketch-map.

## COUNTRIES OF THE OLD EMPIRE OF AUSTRIA-HUNGARY

Before the Great War of 1914–1918 there was a large empire in Central Europe known as Austria-Hungary. The empire was ruled by the Austrians, a German-speaking people, and the capital was Vienna. Many different peoples were included in the empire, and many of them were very unhappy. And so, at the close of the Great War, the empire split up into a number of separate republics.

### AUSTRIA

The present Republic of Austria is only a small fraction of the old empire. It is now a little larger than the state of Mysore and has a few more people. It is almost entirely a mountainous country, and includes the eastern end of the Alps (known as the Tyrol). Cutting through the east of the country is the Danube, and the valley of the Danube is the most important part of the country. Just where the Danube leaves the mountains and enters the Hungarian Plain lies *Vienna*, the capital. When Vienna was the capital of the old empire it was a very large and flourishing city ; now its fine Government buildings are too large, they are half empty or little used. Even now more than one-fourth of all the people in the country live in Vienna.

Austria has little or no good coal, but water power can be developed in the mountains. It has some mineral deposits, especially of iron. Vienna occupies an important position in Central Europe at the meeting of main routes,

but it will be long before Austria can become a prosperous country. It is so mountainous that it cannot grow sufficient food for its people. It has some valuable forests and ore deposits, but little used.

### HUNGARY

In many respects Hungary is exactly the opposite of Austria. It is a little larger and has a few more people, but whereas Austria is almost entirely mountainous, Hungary is almost entirely a plain. The Plain of Hungary, running through the centre of which is the Danube, is shut in on all sides by mountains. As a result of the wall of mountains, Hungary is cut off from the moderating influence of the sea and has a continental climate of great extremes. The people of Hungary, known as Magyars, are essentially agriculturists. The natural vegetation of the plain is steppe land and there are very few trees. But the natural grassland has almost disappeared. Some of the soil is poor, especially in the north, and rye, oats, and barley are the principal crops. But on the richer land farther south wheat and maize are the main crops, and the yield of good quality wheat is high. Sugar-beet is also grown. Many cattle are kept and fed upon fodder crops or corn, specially grown. Most of the industries of Hungary are connected with agriculture—flour milling, sugar making, and distilling.

Hungary has deposits of good coal in the north-west, and also deposits of lignite, but has little or no iron or other minerals.

*Buda-Pest*, the principal town, really consists of two towns, one on either side of the River Danube. It is situated just where the Danube passes through the only hill range in Hungary, and where the river can be bridged. Buda-Pest is an important railway junction, and the natural collecting centre of the plain. The Danube and its tributaries are also used for transport. *Szeged*, on the River Tisza, is the largest town in the south of Hungary.

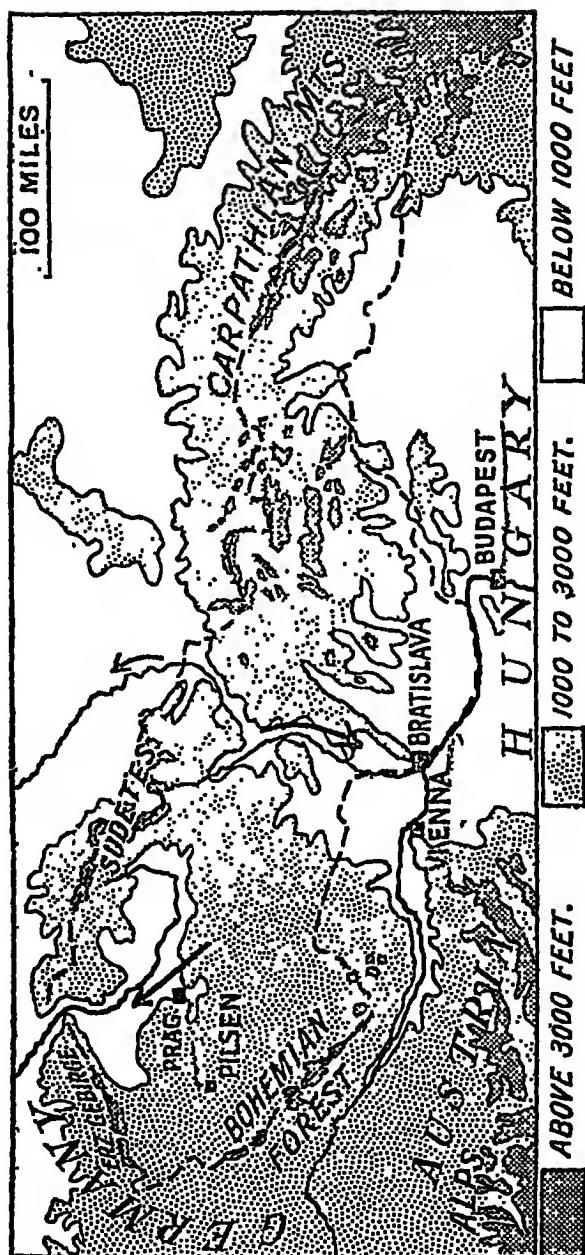


FIG. 200.—Czechoslovakia.

### QUESTIONS AND EXERCISES

1. Switzerland is a country without a coast-line, and therefore she has no ports of her own. By what routes does she export her goods and through what ports?
2. Draw a sketch-map showing the importance of the position of Vienna.
3. What are the chief railway routes into Italy from Northern Europe, and how do they cross the mountains?
4. Describe and account for the climate of Hungary.

### CZECHOSLOVAKIA

Another country which has arisen in Europe as a result of the Great War is Czechoslovakia. Before 1918 it was part of the Empire of Austria-Hungary. It is a mountainous country, in the heart of Europe, and is about the size of the Province of Assam, but with double the population. The country consists of three parts :

(a) The Plateau of Bohemia, surrounded by mountains and sloping gently towards the north-west, i.e. towards Germany. The plateau is drained by the River Elbe and its tributary the Moldau. The Elbe flows through a gap in the north and then through Germany.

(b) The valley of Moravia in the centre cuts the country in half. In the south the River March flows southwards and joins the Danube. In the north the River Oder cuts through the mountains by the Moravian gap and passes through Silesia and Germany.

(c) The mountainous mass of Slovakia in the east consists of the slopes of the Carpathians and the numerous mountain valleys, with fragments of the Hungarian Plain.

Study these three divisions in Fig. 300. It is very difficult to govern a country which is so divided by nature into separate parts, but the people are kept together by a strong national feeling and a desire to make their new country successful. Czechoslovakia is already the most efficient of the new countries of Europe, and one of the most highly developed territories of Europe.

The Plateau of Bohemia has numerous rich coalfields, both of hard coal and lignite. Various minerals occur in the surrounding mountains. The broad valleys of the rivers which drain the plateau—the Moldau and the Elbe—have very rich alluvial soils and produce crops of very high quality. Potatoes and wheat form the staple food of the people, but hops are grown for brewing (Pilsener Beer at Pilsen) and sugar-beet for making sugar. Cotton mills, glass and chemical factories have sprung up on the coal-fields, whilst paper mills and saw mills are found near the forested mountains where water power is available. Iron

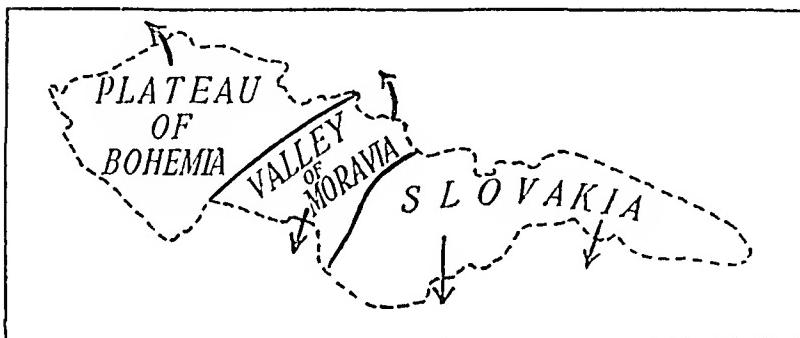


FIG. 300.—The natural regions of Czechoslovakia. The arrows show the natural outlets of each region.

ore is found between *Prague* and *Pilsen*, and both these places have iron and steel works, whilst *Prague*, the capital of the country, has manufactures of many kinds. In the higher and poorer parts of the plateau rye, oats, and barley take the place of wheat.

The Moravian Lowlands have also good agricultural lands where barley and sugar-beet are grown and, in the south, maize and fruits. But the lowlands have rich coalfields—in the north is part of the Silesian Coalfield, and there are other coal and lignite fields farther south. The coalfields have attracted manufacture—woollen goods and machinery are both made at *Brno*. The Moravian Lowlands have two outlets—one to the south through the

river port of Bratislava on the Danube; one to the north through the Moravian gate.

The Carpathians are largely covered with valuable forests and many places are rich in minerals. They require development. In the mountain valleys barley, sugar-beet and potatoes are grown, whilst numerous cattle and sheep flourish on the mountain pastures.

**Communications and Trade.**—Czechoslovakia is in an unfortunate position regarding communications. There was until recently no railway from one end of the country to the other. The natural outlet of Bohemia is down the

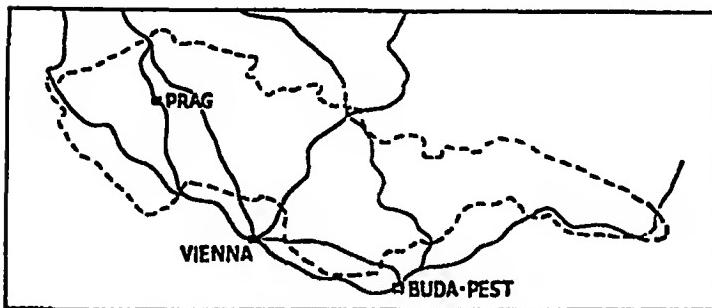


FIG. 301.—The railways of Czechoslovakia.

Notice the absence of a main railway running from east to west, though a through railway has now been built.

River Elbe through Germany to Hamburg. The outlet of Moravia is down the Oder to Stettin, or through Bratislava on the Danube. The railways from Bohemia and Moravia centre on Vienna in Austria, and those from Slovakia centre on the Hungarian capital of Buda-Pest. Thus the trade of Czechoslovakia passes through many different countries and in many directions. The exports consist mainly of manufactured goods.

#### QUESTIONS AND EXERCISES

1. Draw a sketch-map to show the main gateways leading out of Czechoslovakia.
2. Describe fully why Czechoslovakia is a difficult country to govern.
3. What are the chief industries in the western part of Czechoslovakia, and why are they carried on?

### **YUGOSLAVIA, OR KINGDOM OF THE SERBS, CROATS, AND SLOVENES**

Yugoslavia is one of the states which grew up after the Great War from the break up of Austria-Hungary. It consists of the old kingdoms of Serbia and Montenegro, together with a broad tract of land along the Adriatic Sea as far as the Italian border. The area and population is roughly the same as the Central Provinces of India.

The country falls into three parts, very different from one another:

- (a) The mountainous region of the Adriatic Coast.
- (b) The northern plain—part of the plain of Hungary.
- (c) The southern mountainous region—part of the Balkan Peninsula.

The Adriatic Coast, or Dinaric Region, consists of the fold ranges of the Dinaric Alps. Most of the hills are of limestone. Great underground channels have been formed in the limestone by the action of water, and much of the drainage is now below the surface. The natural result is that the surface is dry and barren, and the special name of "Karst," or Karstlands, is given to this type of country. The ranges run parallel to the coast, and so it is difficult to cross them. Although Yugoslavia has a long coast-line it is of very little use, and there is no large port. Crops can only be grown in a few of the more favoured valleys. To the north, near the Alps, the country is richer and has forests and mineral deposits.

The Northern Plain, entirely cut off from the influence of the Mediterranean, has a continental climate—hot summers and cold winters. But the soil in many parts is rich and much wheat and maize are grown, together with tobacco and sugar-beet. Zagreb is the principal town and has industries connected with the local agriculture. Plums are grown on some low hills to the north and dried as prunes. This area is really the edge of the great Plain of Hungary.

The Southern Region is large and varied, highest in

the south and sloping on the whole northwards towards the Danube. The hills are sometimes forested, at other times clothed with mountain pastures suitable for cattle and sheep. There are deposits of iron, lead, and other minerals in places. But the most important parts of the region are the sheltered valleys, where wheat, maize, and fruits flourish. Large quantities of plums are grown and dried for export. The dried plums, or "prunes," are not often seen in this country, but are much used in other parts of Europe. They are also used in making a kind of brandy, the national drink of the Serbians. Other crops include the vine, sugar-beet, hemp, and tobacco. Notice the position of the capital, *Belgrade*, at the northern end of the region on the Danube, and also *Nish* commanding the route to Salonica.

**Communications.**—The State of Yugoslavia has two main outlets—one in the south through the Greek port of Salonica, the other in the north through the Italian port of Trieste. Another port in the north is *Sušak*, adjoining the Italian port of *Fiume*. Although Yugoslavia has a long coast-line it has no good port, and is unfortunate in that its trade has to pass through other states. The state exports timber, fruit (prunes), animals, wheat and maize, and imports manufactured goods. It is still somewhat undeveloped, and in the main an agricultural country.

#### QUESTIONS AND EXERCISES

1. Show clearly the importance of Salonica to Greece and Yugoslavia.
2. At the end of the Great War Yugoslavia and Italy both wanted Trieste and Fiume. Take each one and say which country you think should have it, and why.

#### RUMANIA

Rumania is a kingdom which has nearly doubled in size since the Great War, and now includes a large part of the former Empire of Austria-Hungary. It is now nearly

as large as the Bombay Presideney and has nearly as many people. Forming a great curve of mountains throughout the centre of the country, and dividing it into two distinct halves, are the Carpathian Mountains and the Transylvanian Alps.

(a) The Wallachian Plain—the valley of the Lower Danube lies to the south-east of the mountains.

(b) The mountains form a broad barrier through the country.

(c) Transylvania and the Banat, on the west of the mountains, form a mass of hills and sheltered valleys.

The Wallachian Plain has a continental climate with hot summers, cold winters, and a low rainfall, falling mainly in early summer. It is part of the steppe lands, and is now one of the great wheat-lands of the world. Huge quantities of wheat, barley, and maize are grown, with oats on the poorer lands farther north. *Bucharest*, the capital, lies in this region, *Galatz* and *Braila* are river ports on the Danube, but more important is *Constanta* on the Black Sea which is free from ice all the year. Many of the towns have developed industries connected with agriculture—flour milling, brewing, distilling, and sugar making.

The Mountains are forested up to 5000 feet. On the lower slopes are beech trees, on the higher parts soft wooded coniferous trees grow. The logs are floated down the rivers to saw-mills at Galatz. Above the forests are mountain pastures with enormous numbers of sheep.

In the foothills of the mountains, especially near Ploesti, are rich oilfields. The production of oil in Rumania is nearly double that of India. It is refined at Ploesti and sent by pipe line to Constanta.

Transylvania and the Banat have valuable mineral deposits—gold, silver, copper, lead, iron, and coal—as yet little developed. Many of the hills are wooded, large numbers of sheep are kept on the hill pastures, while cultivation is carried on in the valleys. Maize is the principal crop.

Rumania is essentially an agricultural country. Its principal exports are wheat, maize, timber, petroleum, and livestock ; its imports are cotton and woollen goods and machinery.

Before leaving Rumania, notice the difficulty of getting from one part of the country to another owing to the mountains. The Danube is an international river, shared by many nations. Its lower course is frozen in the winter. Notice also where the Danube passes through the great gorge known as the Iron Gate, now made navigable.

## BULGARIA

Bulgaria is a small and mountainous kingdom, lying to the north of Greece. It falls into three parts :

- (a) The Valley of the Lower Danube in the north.
- (b) The Balkan Mountains and the Rhodope Mountains.
- (c) The Valley of the Maritza.

Bulgaria lies outside the Mediterranean climate region and suffers from very cold winters. Compared with most of the countries of Europe, Bulgaria is undeveloped. Agriculture is the chief occupation of the people, and two-thirds of them depend entirely on the agriculture, but the cultivation is of a primitive kind. One-third of the whole country—mostly in the two valley regions—is cultivated ; rather less than one-third—mainly on the mountains—is under forests of oak and beech. Large numbers of sheep and goats are kept on the mountain pastures, and large numbers of pigs feed on the acorns in the oak forests. The principal food crops are wheat and maize ; large areas are also planted with tobacco and sugar-beet. Fruit grows in abundance, especially in the sheltered valleys of the south-west. The Maritza Valley used to be famous for a very valuable perfume, attar of roses, made from roses. A little is still produced.

Sofia, the capital, is the largest town. Notice its

important strategic position on the main railway route (the Orient Express Route) between Europe and Asia Minor.

*Philippopolis* is the centre of the Maritza Valley. In the neighbourhood mulberry trees are grown and silk-worms fed on them.

*Ruschuk* is a river port on the Danube; *Varna* is on the Black Sea.

Bulgaria exports tobacco and cereals, and imports cotton and woollen goods.

#### QUESTIONS AND EXERCISES

1. Draw a sketch-map to show the importance of the position of Sofia.
2. What countries lie in the Basin of the Danube? Discuss the importance of the river to each country through which it passes.

## RUSSIA

Before the Great War Russia was the largest country in Europe, and, next to the British Empire, the Russian Empire was the largest in the world. The old Russian Empire comprised one-seventh of all the land of the globe. In 1917 there was a revolution in Russia, and the emperor (the Czar) abdicated. Many parts of the old Russia in Europe became separate, independent republics about which we have already learnt—Finland, Estonia, Latvia, Lithuania, and Poland. What is left now forms a number of republics which are grouped together as the U.S.S.R. (Union of Soviet Socialist Republics). The Union consists of one large state and a number of small ones.

A Soviet Republic is quite different from all other republics. All land, forests, minerals, livestock, factories, mines, railways, etc., belong to the State. The state is ruled by a council, or Soviet, elected by the people, at the head of which is the President. The Soviet makes laws

and rules according to which the people may work the land or work in factories. So the President is a very powerful man, and has much more power than the president of an ordinary republic. If the President and the Soviet

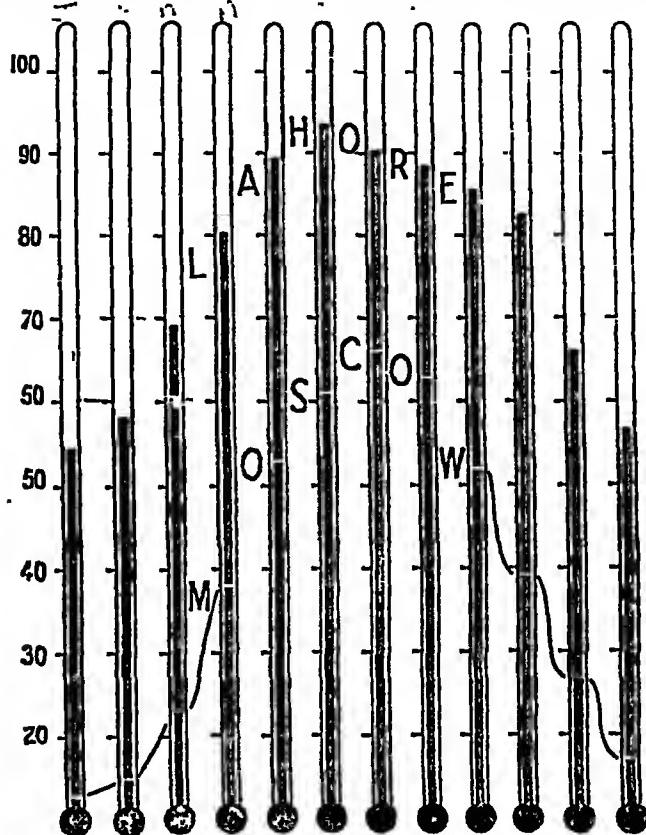


FIG. 302.—A comparison of the temperatures of Lahore and Moscow.

Both places are far from the sea and have great extremes of temperature (continental climate). But Lahore is, of course, much hotter than Moscow.

act wisely the rule may be good, but if they are unjust the people may suffer very greatly.

Russia in Europe is an enormous country, but almost

entirely flat. To the east it is separated from Asia by the low mountain ridge of the Urals, in the extreme south-east are the Caucasus Mountains. The remainder is a plain, rarely more than 500 feet above sea-level. The Valdai Hills, from which the great rivers of Russia take their rise, are not more than 1000 feet high. The greatest river of Russia is the Volga, which wanders across the country and is joined by many tributaries before it empties itself into the Caspian Sea, the largest lake in the world. More than half Russia is in the basin of the Volga. Important rivers flowing northwards are the Northern Dwina (to the Arctic Ocean) and the Western Dwina (to the Baltic Sea). Flowing southwards into the Black Sea are the Dniester, Dnieper, and Don.

The whole of Russia is far removed from the influence of the sea, and has a very continental climate with great extremes of temperature. Of course the north is colder than the south, but in winter the whole country is frozen.

Russia may be divided into seven natural regions, based on the natural vegetation of the country. Refer to Fig. 303, and what we said about the natural vegetation and notice that Russia falls into these simple divisions :

- (a) The Tundra in the extreme north.
- (b) The Coniferous Forest Belt.
- (c) The Deciduous Forest Belt.
- (d) The Steppes.
- (e) The Desert.
- (f) The Ural Region.
- (g) The Caucasus Region.

The Tundra, along the shores of the Arctic Ocean, is of little use. It is inhabited by a few Lapps and Samoyedes who wander about with their reindeer. Murmansk, in the extreme north, has recently been connected with Leningrad by rail. Owing to the warm waters from the North Atlantic Ocean, it is free from ice.

The Coniferous Forest Belt is still largely covered with natural forest. In the west, around the glacial lakes of Ladoga and Onega, cultivation is carried on and flax

is grown. In the south-west lies *Leningrad* (formerly called Petrograd, and before that St. Petersburg). Notice



FIG. 303.—Russia.

the position of Leningrad on a deep inlet of the sea, giving access to the interior of Russia, but at the same time easily accessible by water from the industrial countries of North-

West Europe. Leningrad is guarded by the island fortress of Kronstadt, but the new republics of Finland and Estonia now control the entrance to the gulf. The port of *Archangel*, on the White Sea, is blocked by ice for five or six months of the year.

The Deciduous Forest Belt covers a broad tract of land in the centre of Russia. The forest has been cleared over large areas, especially in the west, and the belt is in the main an agricultural one. The chief crops are flax, rye, barley, oats, and potatoes. Flax and linseed, together with Russian hemp, are exported, but enough grain is not grown to feed the people. In the centre of this region lies *Moscow*, the capital of Russia. Moscow is the centre of the Russian railway system, and is well situated with regard to navigable rivers. Just to the south lies a coalfield. As a result Moscow has become the centre of an industrial region with many cotton mills, woollen mills, and linen mills as well as engineering works. Most of the trade from this region passes through Leningrad, since the port of *Riga* is no longer in Russian territory.

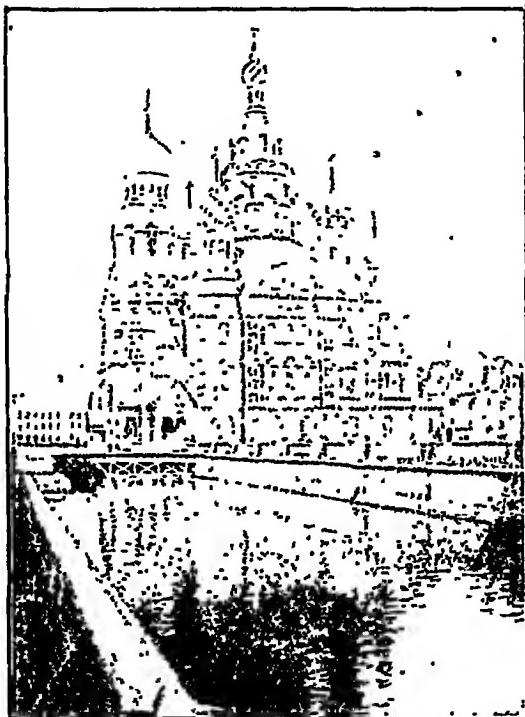
The Steppes of South-Western Russia are famous for their rich black soil, which is ideal for wheat. So this region forms one of the great wheat lands of the world, and wheat is sent by rail and river to the Black Sea ports, especially *Odessa*, for export. Other crops, grown more for home use, are rye and barley and, in the wetter southwest, maize and sugar-beet. In the heart of this region lies the Donetz Coal Basin, larger and richer than that of Moscow. Near by are rich deposits of iron ore, and large quantities of pig-iron are produced. Manganese ore also occurs. Big centres in the grain-growing region are *Kiev* and *Kharkov*.

The Desert.—Eastwards the fertile steppes become drier and pass gradually into the salt deserts round the north of the Caspian Sea.

The Urals are famous for their richness in minerals. The greater part of the world's supply of platinum, as

well as gold, copper, and large quantities of iron ore, are obtained, especially near *Perm*.

The Caucasus forms another rich mineral region, notable especially for the oilfields around *Baku*. After the U.S.A. and Mexico, Russia is the largest producer of



[Photo : L. D. Stamp.

FIG. 304.—A church in Leningrad, Russia.

Russia is very different from the other countries of Europe. Notice that this church is much more like a Mohammedan building.

mineral oil in the world—about 5 per cent. of the world's supply (U.S.A. and Mexico 45 per cent.), and about six times as much as India. Much of the oil is used in Russia, being sent into the heart of the country by the River

Volga, but large quantities are sent from Baku to Batum on the Black Sea and exported from there. There are many other minerals in the Caucasus, but they are little touched at present.

**Communications of Russia.**—Russia has a large number of navigable rivers, but they nearly all are frozen over in the winter. The largest of them all, the Volga,

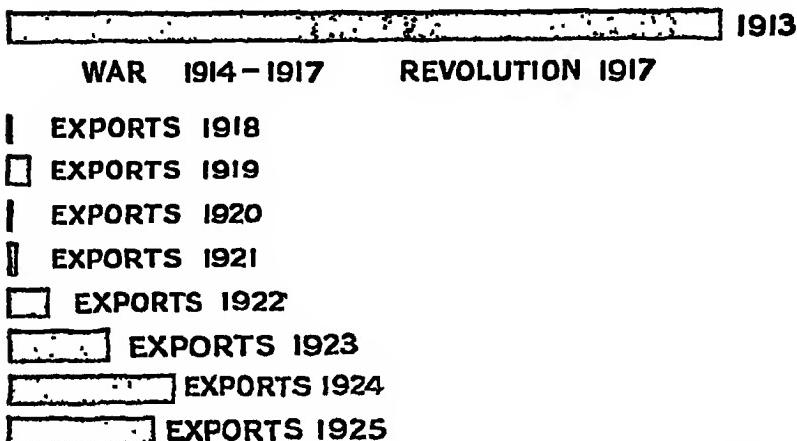


FIG. 305.—Effect of war and revolution on the exports of Russia.  
Exports in 1926 and 1927 were about the same as 1924.

unfortunately flows into a lake (the Caspian Sea). There are 45,000 miles of railway. The Russian railways are of a larger gauge than those of the rest of Europe, and so trains cannot run direct from Russia to Western Europe.

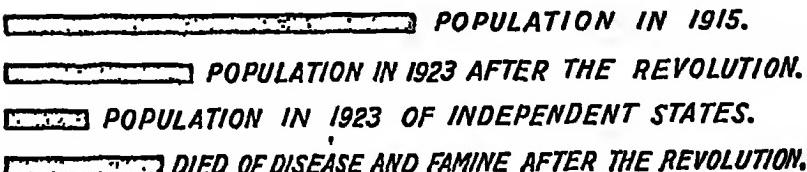


FIG. 306.—The effect of revolution on the people of European Russia.

**Production and Trade of Russia.**—Russia has suffered very greatly from war, revolution, and famine. From 1917 to 1922 enormous numbers of people died from disease and starvation. Even now Russia is recovering

but slowly. The workers are less civilised than in other countries of Europe, and over the north of the country live in poor wooden huts. Fig. 306 shows the variation in the trade of Russia in recent years, and how it has suffered from the revolution. At the present time the other nations of the world find it difficult to trust the Soviet Government, and the trade is still very much less than when Russia was an Empire.

#### QUESTIONS AND EXERCISES

1. Say all you know about the present form of government in Russia. How does it differ from the pre-war government?
2. What are the chief methods of transport in Russia?
3. What difficulties does Russia encounter in the exportation of her products? How does she overcome them?
4. How can you account for the fact that Russia is the most backward country of Europe as far as the general population is concerned?

#### EUROPE (GENERAL)

##### QUESTIONS AND EXERCISES

1. Describe and account for the movement of the centres of European civilisation northward.
2. Draw a sketch-map of Eurasia, marking the chief land and sea routes between the two continents.
3. Describe briefly the chief fold mountains of Europe showing their connection with the fold mountains of Asia. Draw a sketch-map to illustrate your answer.
4. Europe is sometimes called a peninsula of Asia. How far is this true?
5. What changes were made in the political boundaries of the Balkan States after the Great War? What reason can you give for these changes?
6. Divide Europe into natural vegetation regions, describing each one briefly.
7. Europe depends very largely on other continents for the raw materials for her industries. What raw materials does she produce herself, and where are they manufactured?
8. Describe briefly and account for the climate of the Mediterranean.
9. "The importance of a port depends upon the richness of its hinterland." Discuss this statement with reference to Marseilles, Liverpool, London, Hamburg, Lisbon, Oslo, Riga, Trieste.
10. Draw sketch-maps to illustrate the position of the following towns: Paris, Vienna, Basle, Madrid, Strassburg, Sofia, Leningrad.

11. What is meant by an international river? What rivers of Europe ought to be international? Why?
12. Compare and contrast Scandinavia and Italy.
13. Write a brief description of the Danube Basin.
14. To whom do you think Alsace-Lorraine should belong, and why?
15. Divide France into natural regions, describing one fully.
16. Write an account of the industrial development of Czechoslovakia.
17. Write an account of the mineral wealth of Europe under the following headings: Coal, iron, copper, and lead.
18. Compare and contrast the climate of Western France and North-Eastern Russia.

## C. NORTH AMERICA

### 1. POSITION AND SIZE

Look first at Fig. 307 and notice the position of three important lines of latitude and longitude. From north to south right through the centre of the continent is the longitude of  $100^{\circ}$  west. Roughly half the continent lies to the east of this line and roughly half to the west. The Arctic Circle (latitude  $66\frac{1}{2}^{\circ}$  N.) runs through the north of the continent across Baffin Island and the south of Greenland—that is, almost across the broadest part of the continent. Notice how in this latitude America is only separated from Asia by the narrow Bering Strait, and the European island of Iceland is very near Greenland. Very roughly the continent is shaped like a triangle, with the base in the north and tapering southwards. Now look at the Tropic of Cancer, which cuts through the narrow part of the continent. It passes through the tip of the Californian Peninsula, but just misses the tip of the Peninsula of Florida. One other point is useful—latitude  $49^{\circ}$  N. marks the boundary between Canada and the United States for a great distance.

North America is the third largest continent next to Asia and Africa. It is nearly eight million square miles, and is 6000 miles from north to south.

### 2. PHYSICAL FEATURES

North America falls very simply into three divisions :  
(1) The Western Mountains, or Rocky Mountain System.

- (2) The Central Plains.
- (3) The Eastern Highlands.
- (1) The Rocky Mountain System is a great system of young fold mountains, and forms part of the great girdle of mountain which surrounds the Pacific Ocean. The mountains were raised up at about the same time as the

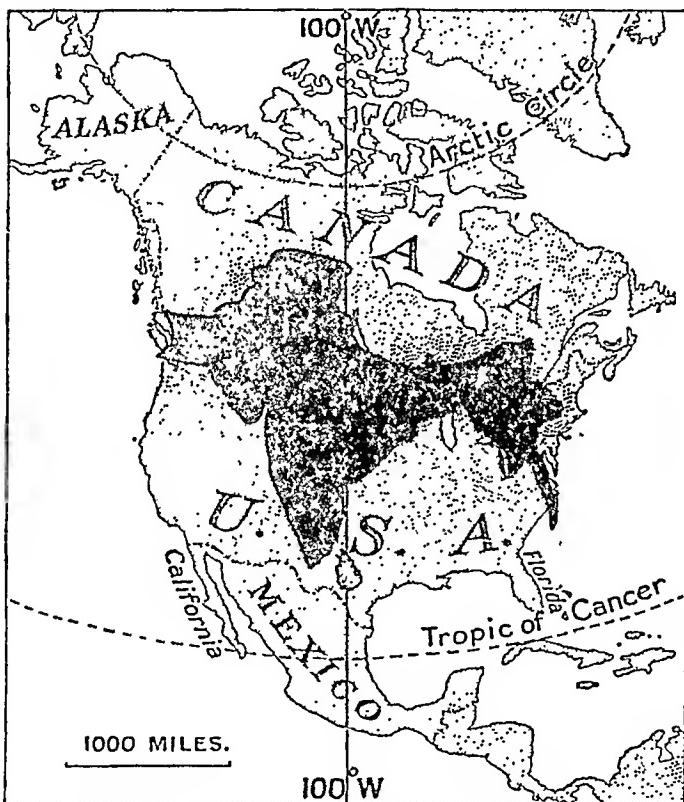


FIG. 307.—The position and size of North America.

Himalayas or the Alps. The Rocky Mountain System does not consist of one great range, but of a number of parallel ranges. In the *north* the ranges are close together but get gradually higher as we go from the coast inland. There is first the fine Coast Range, then a series of small plateaux,

then the lofty Selkirk Range, and finally the Rocky Mountains themselves. Farther south the whole system gets very much broader, and between the ranges are great

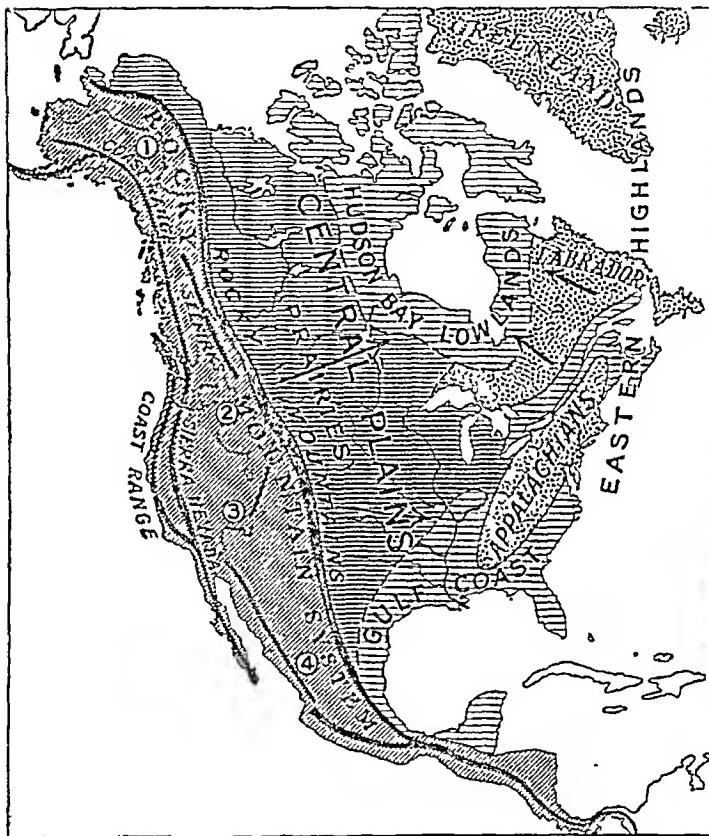


FIG. 308.—The main physical features of North America, showing the three main physical divisions of the continent.

The arrows indicate the direction of slope of the Central Plains (Prairies) and the Plateau of Labrador. 1—Plateau of Yukon; 2—Columbia Plateau; 3—Colorado Plateau; 4—Plateau of Mexico.

plateaux. Along the coast lies the Coast Range, behind which are the important valleys of California. Then

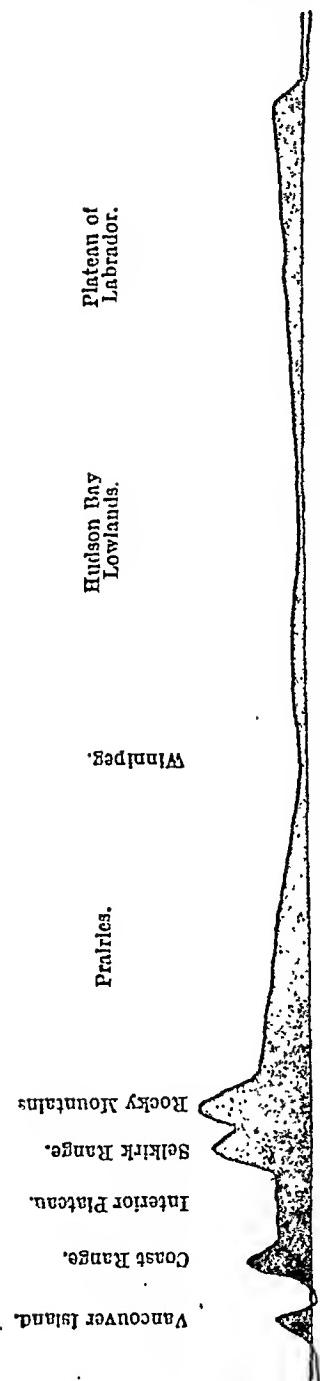


Fig. 309.—Section across North America from west to east, roughly along the line of the Canadian Pacific Railway.

comes the lofty Cascade Range and the Sierra Nevada. Between the Cascade Mountains or the Sierra Nevada and the main range of the Rocky Mountains themselves lies the region of great Plateaux. Passing into Mexico still farther south, the Rocky Mountain System again becomes narrower and passes finally as a single chain through the Isthmus of Panama. Follow all these points carefully on Fig. 308.

(2) The Central Plains. Although the whole of the centre of North America is occupied by land which is nearly flat, or only gently wavy, you must not think it is all *lowland*. There are two great areas of lowland, one round the Hudson Bay in the north, and one round the Gulf of Mexico. These two lowland areas are nearly connected along the line of the Mississippi and Red rivers and the region of the Great Lakes. But westwards the ground rises very gently and gradually, becoming higher and higher until the Rocky Mountains are reached. You will be able to understand this more easily if you look at the section, Fig. 309.

(3) The Eastern Highlands. In the east of North America

there are three great highland areas: The high plateau of Greenland, the old Laurentian Plateau (or Plateau of Labrador), and the Appalachian System of Mountains. The Plateau of Labrador slopes down gradually to the Hudson Bay lowlands. Between the southern part of the Appalachian Mountains and the sea is an important coastal plain.

### 3. RIVERS AND LAKES OF NORTH AMERICA

There are two groups of rivers:

(a) Those which drain the Rocky Mountain System and flow usually to the Pacific Ocean.

(b) Those which drain the Central Plains and flow usually to the Atlantic Ocean.

The great water parting is formed by the main crest of the Rocky Mountains.

(a) Belonging to the first group are the Yukon in the cold north, the Fraser in Canada, the Columbia with its tributary the Snake, and the Colorado, famous for its canyon, in the United States. Amidst the Rocky Mountains and on the plateaux there are numerous lakes. The largest is the great Salt Lake of Utah. This lake is in a very dry part of the United States and has no outlet to the sea.

(b) All over the lowlands of the north-east are numerous shallow lakes. In the far north are the Great Slave Lake and the Great Bear Lake which drain by the Mackenzie River into the Arctic Ocean. In the centre of Canada is Lake Winnipeg. Flowing into this lake are the Saskatchewan River and the Red River, and the lake itself has an outlet to the Hudson Bay through Nelson River. On the borders of Canada and the United States are the Great Lakes—Superior, Michigan, Huron, Erie, and Ontario, all draining by the St. Lawrence River to the Atlantic Ocean. These lakes form a fine navigable water-way, from the west of Lake Superior to the east of Lake Erie, but farther east, between Lake Erie and Lake Ontario, are the famous Niagara Falls. A canal has now been built round the

falls, so that the smaller ocean steamers can pass from the Atlantic right into Lake Superior.

Nearly the whole of the Central Plains in the United States are in the basin of the Mississippi River. Notice the great tributaries of this river—the Missouri, Arkansas, and Red rivers from the west and the Ohio from the east. The main river flows southwards into the Gulf of Mexico.

Finally we must notice the rivers down the east coast of the United States. They are short, but important, because they have cut gaps through the Appalachian Mountains and the easiest routes from the coast inland are along the river valleys. The most important is the Hudson and its tributary the Mohawk, the Delaware, and the Potomac.

#### 4. GEOLOGY

The Rocky Mountain System, like most of the great fold mountains of the world, consists of a great variety of rocks. In some parts valuable ores are found such as gold in the Yukon, various minerals in the United States, and silver in Mexico. You remember that when we were studying India we learnt that oilfields occur on the flanks of great fold ranges such as the Himalayas. This is particularly true of America. The United States and Mexico produce nearly nine-tenths of the mineral oil of the world, and the great oilfields are found on the *flanks* of the Rocky Mountain System—both on the west in California and on the east in Central United States.

The whole of the north-east of the continent is formed by a mass of old hard crystalline rocks, very like the rocks of the Deccan in India. This area is called the "Canadian Shield," and many places are very rich in minerals—iron, copper, silver, gold, cobalt, nickel. The Appalachian Mountains are older than the Rockies, and it is on the western side of them that the greatest coalfields are found—in Pennsylvania. Important oilfields are also found on the western flank of these mountains. Underlying most

of the remainder of the Central Plains are young soft rocks.

Long after the mountain systems were formed, but many thousands of years ago, North America was very much colder than it is now. The whole of the north of the continent was covered by a great sheet of ice. A huge ice sheet still covers Greenland at the present day. You have learnt that ice when it moves over a country is able to scoop out hollows. The great ice sheet which once covered Canada did this, and so we find all over the north-east of the continent large numbers of lakes, big and small, occupying the hollows made by the ice sheet. In many places the ice scraped off all the loose soil from the land and crushed up many hard rocks, and so we find large stretches of almost bare rock. But in other places the crushed rock was strewn all over the surface, and left behind when the ice sheet melted. So we find the northern part of the Central Plains is covered with a thick mantle of "glacial drift."

##### 5. CLIMATE

**Temperate.**—North America is in the Northern Hemisphere, and so its cold season is the same as ours. January is usually the coldest month. Look at Fig. 310, which is a temperature map for the month of January. You notice that the isotherm of  $32^{\circ}$ , or freezing point, cuts right across the continent, and that more than half the continent has a temperature below freezing in January. You see that the line makes a big bend southwards, and that the west coast is much warmer than the east coast. Why should this be? The west coast is kept warm by the influence of the warm North Pacific Drift, a current which flows across the Pacific Ocean from Japan to the coast of British Columbia. The warm, moist S.W. Anti-Trade Winds also blow across the ocean and help to keep the west coast warm, but their warming influence is not much felt beyond the Rocky Mountain barrier. Occasionally, however, a warm wind

known as the "chinook" (warm because it is descending and becoming denser) blows down from the mountains to the plains, providing a welcome relief from the intense cold. The centre of the continent is very cold because it is far from the sea ; icy winds blow from the Arctic regions, and there is no mountain barrier to hinder them. Compare this

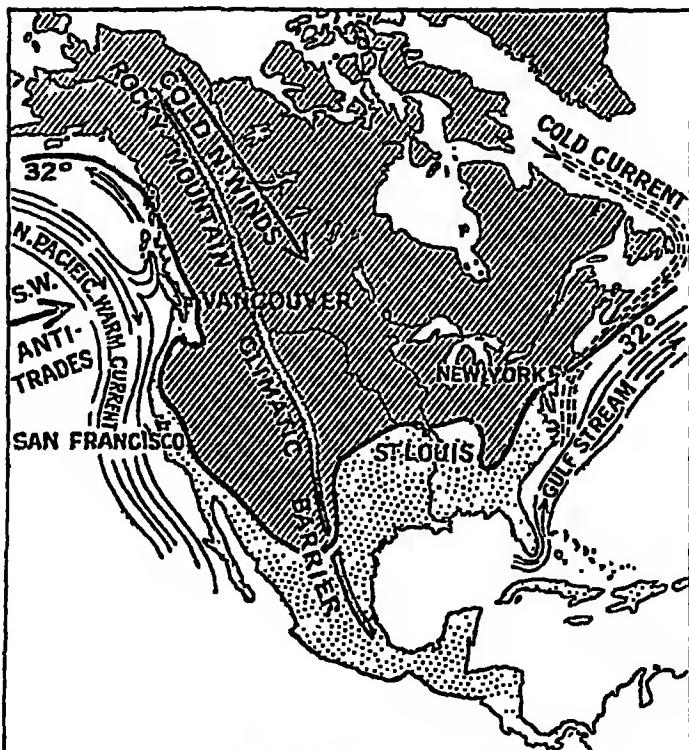


FIG. 310.—The temperature of North America in January.

with Asia, where the mountains run from west to east and prevent the cold northern winds from reaching India. The east coast feels the moderating influence of the sea a little, but there is a cold current flowing southwards near the coast. So New York, although in the same latitude as Naples, is below freezing point in January.

Now let us look at conditions in July, when the sun is

shining vertically over Mexico, and there is a small area where the temperature is more than  $90^{\circ}$ . At this season the west coast is kept cool by the influence of the sea, but the centre of the continent gets very warm. Even as far north as the Arctic Circle the temperature is nearly  $60^{\circ}$ . On the east coast, the Gulf Stream is stronger than the

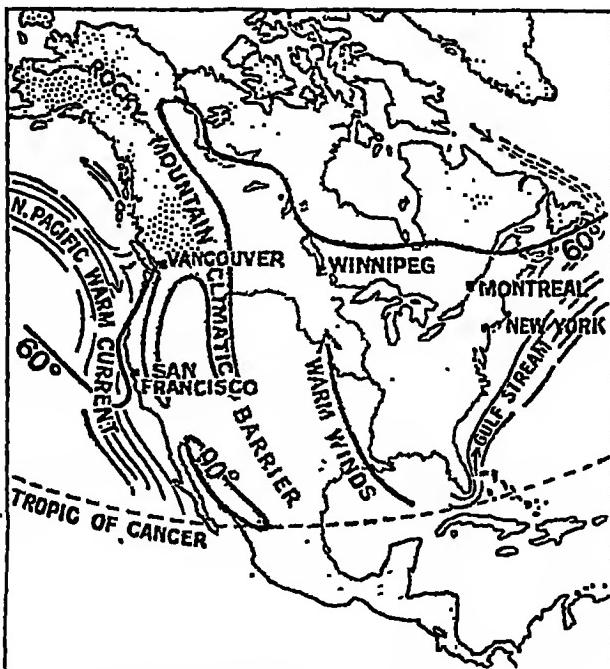


FIG. 311.—The temperature of North America in July.

cold current from the north, and New York is nearly as hot in July as Bombay.

**Winds.**—A large part of North America, lying, like the British Isles, in Temperate latitudes, has its climate and weather controlled by cyclones and anticyclones (cf. p. 56). But although, as shown in Fig. 249, winds may thus be felt from all points of the compass, the dominant direction is

south-westerly, as in Britain, and so the position of the main mountain ranges on the western side of the continent very greatly influences the distribution of rainfall (cf. Figs. 312 and 313).

South of about latitude  $32^{\circ}$  the Trade Winds are blowing and bring rain to the south-eastern part of the U.S.A.,

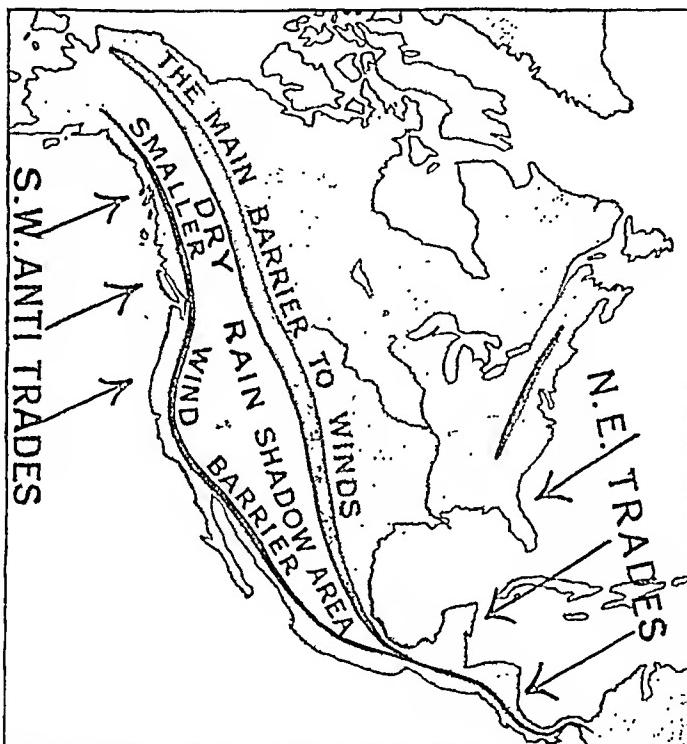


FIG. 312.—The mountain ranges and regular winds of North America.

Compare this map carefully with the rainfall map.

the West Indies, and Central America. They are robbed of their moisture in crossing so much land, and so in winter the land beyond the Rocky Mountains is dry. But in the summer the sun makes the plateau of Mexico very hot and a local monsoon blows from the Pacific Ocean. On the west coast, farther north, there is a small but important region where the Anti-Trade Winds blow in winter, but,

owing to the swing of the wind systems, not in summer. This region, which centres around San Francisco, has thus a Mediterranean Climate.

**Rainfall.**—Remember what has been said about the winds and you will easily understand the rainfall. The northern part of the west coast and the Pacific slopes

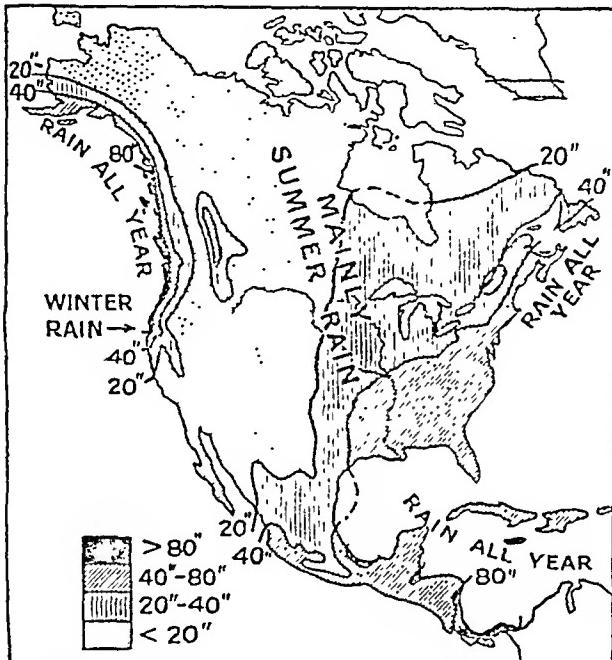


FIG. 313.—The rainfall of North America for the whole year.

Notice very carefully the good constant rainfall where the Anti-Trade winds or Trade winds are blowing for the whole year. Notice the dry plateaux between the main crest of the Rockies and the coastal ranges (rain shadow area). Notice how the rainfall decreases from the Atlantic coast inland.

of the Rockies get a good rainfall all the year round from the South-Westerlies. Many of the deep valleys between the ranges of the Rocky Mountain System are sheltered from the rainy winds and remain very dry. This heavy rainfall is due to the warm winds being forced to rise over

the high mountains, and it is heaviest in winter, when the mountains are coldest and the cyclones are most frequent and most intense. When the winds reach the Central Plains they are dry, and as they are descending, and so getting warmer, they do not drop any moisture. The Plains thus get most of their rainfall in summer, when the hot air rising causes thunderstorms. The Mediterranean Region, farther south on the west coast, has its rain, of course, only in the winter. The South-Eastern States, West Indies, and the east coast of Central America get a good rainfall all the year round from the Trade Winds, but the western coasts of Mexico and Central America get their rainfall from the local monsoon in summer.

#### 6. NATURAL VEGETATION

The vegetation zones of North America are very simple.

(a) *Tundra* stretches as a belt across the north from Alaska to Labrador.

(b) *The Coniferous Forest belt* lies to the south of the Tundra and also stretches right across the continent. Coniferous Forest also occupies most of the Rocky Mountains in the north, and farther south wherever the rainfall is sufficient. The higher parts of the Appalachian Mountains are also covered with Coniferous Forests.

(c) *Cool Temperate Deciduous Forest* occurs down the west coast and in the North-Eastern United States. In both cases, however, the forests are different from those of Europe, because mixed with the deciduous trees are many evergreen trees. In the west are the giant Sequoia and Douglas Firs; in the east are larches and spruces. On the map, Fig. 314, the forests with Douglas Firs have not been separated from the more northern coniferous forests.

(d) *Temperate Grasslands, or Prairies*, occupy a great triangle in the centre of the continent. They gradually get drier towards the west.

(e) *Mediterranean Vegetation* occupies a small area on the Pacific coast.

(f) *Deserts* occupy the dry plateaux of the Rocky

Mountains in the United States and Mexico. The plateaux are high above the sea-level, and so they are cold in winter, but get hot in summer.

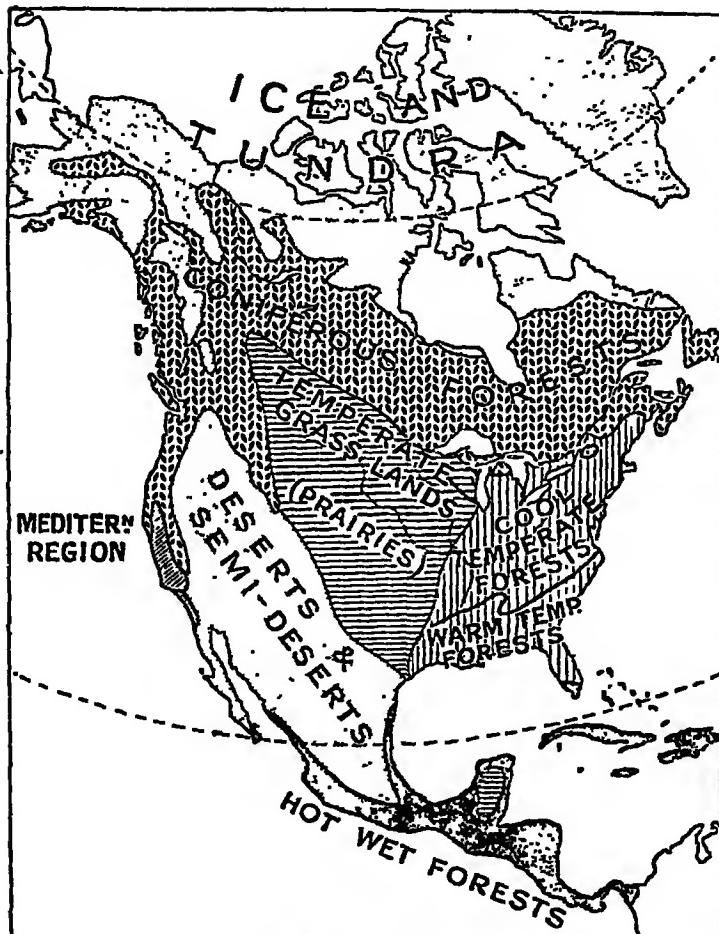


FIG. 314.—The vegetation of North America.

(g) *Warm Temperate Forests* occupy the south-eastern part of the United States.

(h) *Hot Wet Evergreen Forests* occupy Central America and the West Indies.

#### 7. POPULATION

The native inhabitants of North America are the Redskins, or American Indians. They were mostly hunters, and roamed over the great grasslands and lived mainly



FIG. 315.—The population of North America.

Each dot represents 500,000 (half-a-million) people or 5 lakhs of people. This map is on the same scale as the population maps of the other continents.

on the flesh of wild animals. In Mexico and Central America some of the American Indians, especially the group known as the Aztecs, were much more highly civilised and built themselves fine cities. The existence of the northern part of North America was known long ago to the people of Norway, but when we talk about the discovery of America by Europeans, we refer to the discovery of the West Indies in 1492 by Columbus. Columbus

was seeking a new route from Europe to India, and thought the new land he had found was really part of India. After the voyage of Columbus, many adventurous travellers sailed to explore the new land. After a little while Europeans went to settle along the east coast. Frenchmen settled in the north, and so we find French is still the language of Quebec; Englishmen settled farther south, and from these settlers have arisen the greatest republic in the world—the United States of America. The United States separated from England in 1775.

#### 8. POLITICAL DIVISIONS

Stretching right across the north of the continent is the Dominion of Canada, an important part of the British Empire. Canada is one of the self-governing dominions of the British Commonwealth of nations. It is divided into a number of provinces. Separated from Canada in government is the island of Newfoundland. Canada is nearly twice the size of India.

The United States of America stretches right across the continent to the south of Canada, and is nearly the same size. Alaska, in the cold north-west, belongs to the U.S.A., which also dominates Cuba and Porto Rico. The United States of America has also the principal right over the land on either side of the Panama Canal. Mexico is a large republic south of the United States. Central America is divided between six small republics and the British Colony of British Honduras. The big island of Haiti is divided between two negro republics; the island of Jamaica and most of the smaller islands of the West Indies belong to the British Empire.

#### CANADA

A hundred years ago Canada was occupied by small numbers of American Indians who roamed the prairies hunting the buffalo. In the east were French and British

settlements, whilst the Hudson's Bay Company had small trading ports round Hudson Bay. In a country twice the size of the whole of the Indian Empire, there were probably fewer people than there are in the city of Calcutta. Canada has grown rapidly in the last fifty years, and there are now about 10,000,000 people in the country. Of these only 100,000 are American Indians. The remainder are white people—descendants of British, French, and other settlers.

Canada may be divided into four natural regions :

- (a) The Rocky Mountains and the Pacific Coast.
- (b) The North (Tundra and Coniferous Forests).
- (c) The Prairies.

(d) The St. Lawrence Basin and Maritime Provinces.

The Rocky Mountains and the Pacific Coast lie mainly in the Province of British Columbia. The northern part constitutes the Yukon Territory. The whole region is mountainous and very different in all respects from the remainder of Canada. The coast is like that of Norway—mountainous islands and peninsulas, separated by deep fiords and straits. The largest island is Vancouver Island, about the same size as Ceylon. Near the coast of the mainland lies the lofty Coast Range, behind it a series of dry plateaux, then the Selkirk Range, and finally the Rocky Mountains themselves. In the north is the Yukon Plateau, drained by the Yukon River, and situated partly in Canada, partly in Alaska. The whole region is under the influence of the South-West Anti-Trade Winds; thus the exposed mountain chains are very wet, whilst sheltered valleys and plateaux in rain-shadow areas may be very dry. The coast is kept mild by the influence of the North Pacific Drift. In many respects the climate of the coast is similar to that of the British Isles, in the same latitude. Except in the higher parts, the hills and mountains are forest-covered. The forests are of fine coniferous trees such as the Douglas Fir, Red Cedar, and White Pine. Lumbering is an important industry. Many parts of British Columbia are rich in minerals, especially copper.

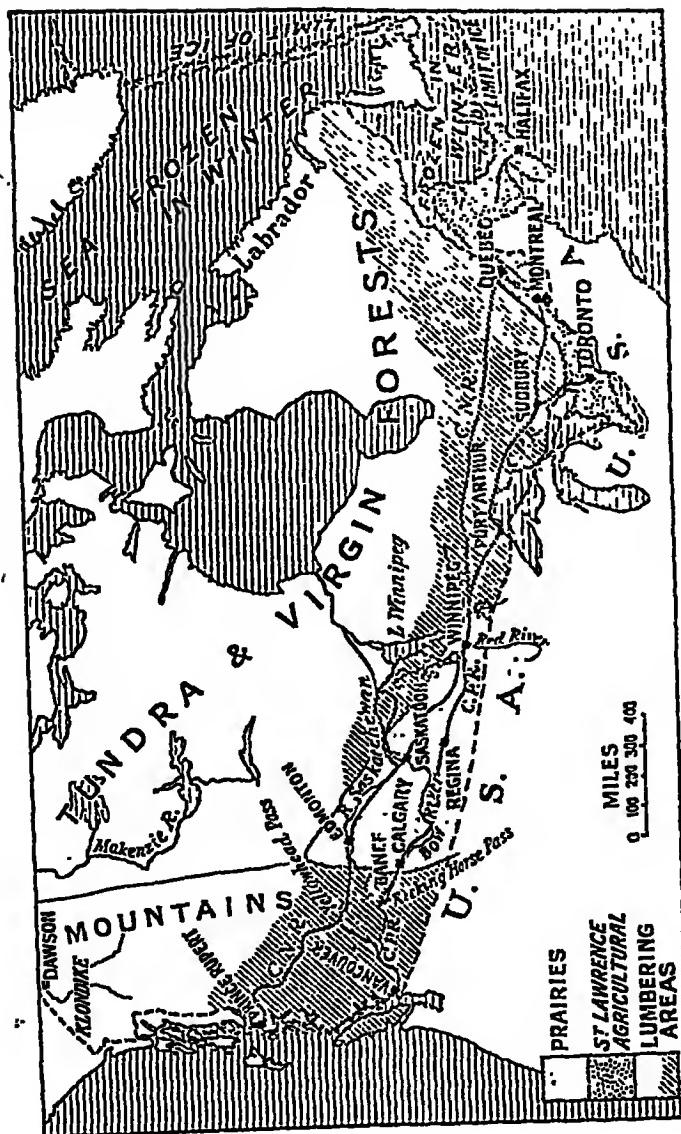


FIG. 310.—General map of Canada.  
Notice carefully the areas which are frozen in winter.

In Yukon were the celebrated Klondike Goldfields. Being situated far to the north, the pioneer gold miners of Klondike suffered terribly in the past from cold. The fisheries of the Pacific coast are world famous. The salmon lives part of its life in the sea and part in rivers. Every year enormous numbers of salmon move up the Fraser River and other rivers, and are netted either in the rivers or in the sea. The salmon are tinned and exported all over the world. True sea fishing is also carried on. The warm, sheltered valleys of the southern part of British Columbia are famous for their fruit orchards—apples, pears, cherries and plums, with peaches and grapes in the warmest parts. The Rocky Mountains themselves form a great barrier between British Columbia and Eastern Canada. At great expense two railways have been built across them. One, the famous Canadian Pacific Railway, starts from Vancouver, goes up the Fraser River and then along its tributary the Thompson, and passes through the Kicking Horse Pass. The other, the Canadian National Railway, was built later. It has two lines, one from Vancouver following the same route as the C.P.R. for part of the way, the other from Prince Rupert. Both lines join and pass through the main chain by the Yellowhead Pass.

*Vancouver* is the principal city in British Columbia. Notice carefully its position (Fig. 317). *Victoria*, on Vancouver Island, guards the entrance both to Vancouver and also to the American port of Seattle. Vancouver has a big trade with Japan and China, and through the Panama Canal.

*Prince Rupert*, farther north, is a terminus of the C.N.R., and a second centre of the fishing industry. Banff (Alberta) is a summer resort in the heart of the Rockies; near by are small coalfields.

**The Cold North.**—To the north of Canada are numerous islands, uninhabited except for a few Eskimo, and covered with ice and snow for most of the year. The Eskimo lives mainly on fish caught through holes in the ice. The northern part of the mainland is occupied by

tundra. As one moves southwards trees gradually appear, and one enters the Coniferous Forest Belt. The forest stretches in a broad belt across Canada from Alaska to Labrador, and as far southwards as the shores of the Great Lakes. In the early days of the development of Canada the Hudson's Bay Company traded largely in furs obtained from the animals of these northern forests. Wild animals are getting scarcer; furs are obtained now largely from

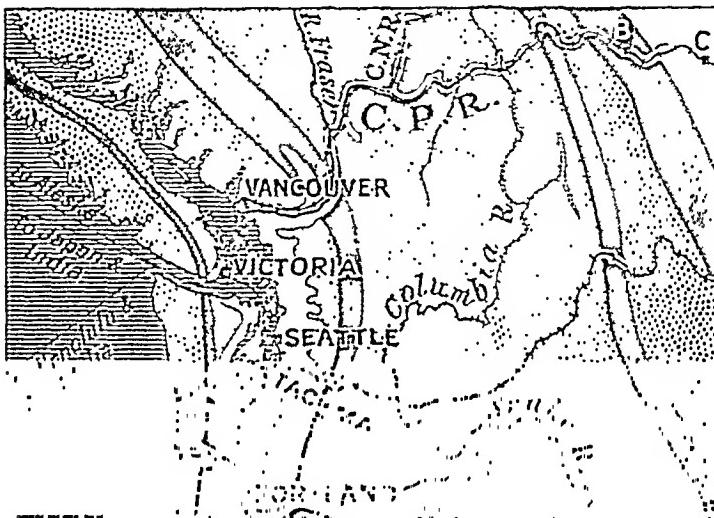


FIG. 317.—The position of Vancouver and Seattle.

Notice that Victoria, on Vancouver Island, controls the entry to both ports.

animals reared on "fur farms." Lumbering and the cutting of "pulpwood" for paper-making are the main industry over most of this region, especially near the Great Lakes. The trees are cut when the snow is on the ground; the logs are dragged over the slippery snow to be floated down the rivers when the snow melts. The saw-mills are usually found where water power is available, as at Sault Ste. Marie. There are enormous undeveloped resources of water power in all this region. Underlying nearly the

whole of the Coniferous Forests is the mass of old hard rocks known as the Canadian Shield, or sometimes as the Laurentian Plateau. Many parts have not been properly explored for minerals, and the most important mineral region at present known is north of the Great Lakes around Sudbury. *Sudbury* now produces four-fifths of the world's supply of nickel and large quantities of copper as well. Large iron ore deposits are known near Sudbury. Around Cobalt are large deposits of silver ore, whilst more cobalt ore is available than the world needs. Gold is also found at Porcupine and Kirkland Lakes, and these regions now produce four-fifths of the gold of Canada.

The Coniferous Forest Belt is too cold for agriculture except along its southern borders, and the soil is usually poor. The region is likely to advance in mining and lumbering rather than in agriculture.

The island of Newfoundland, separate in Government from Canada, really forms part of this region. It has extensive iron ore and other mineral deposits, but is specially famous for the cod fisheries of its southern shores.

The Prairies of Canada form part of the great triangle of treeless grassland in the centre of the North American Continent. The land gradually rises from the level of Lake Winnipeg on the east to the foot of the main Rockies on the west. The rainfall, too, decreases from east to west, and in the south-west it is too dry for agriculture without irrigation. The prairies are often divided into three parts:

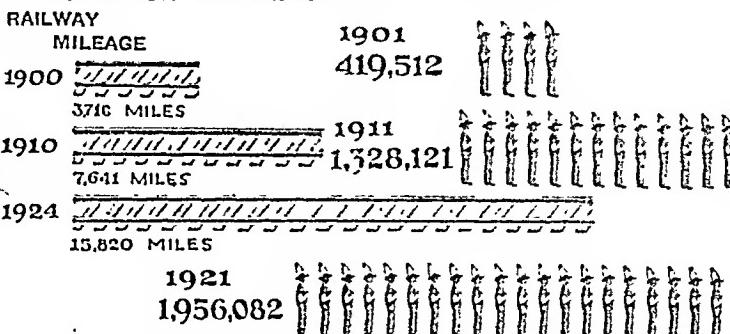
(a) The low prairies, west of Lake Winnipeg and around the Red River. This area was once the bed of a great lake, and has a damp, rich soil and a moderate rainfall, and forms one of the richest wheatlands in the world.

(b) The middle prairies, farther west, are somewhat drier but still form rich wheatlands.

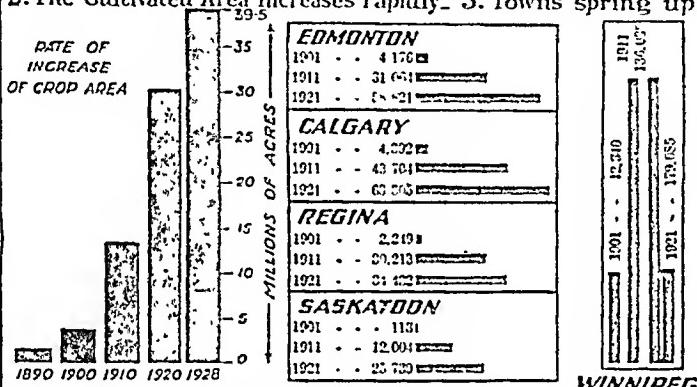
(c) The high prairies are drier, and wheat can only be grown in the best parts. Irrigation from streams from the Rocky Mountains (such as the Bow River) has been carried out, and the area is being developed. At present this is mainly a cattle-ranching area. The grass is rather poor

## THE DEVELOPMENT OF THE PRAIRIES

1. Firstly railways are built; then people come and settle on the land.



2. The Cultivated Area increases rapidly. 3. Towns spring up.



4. Production is enormous.

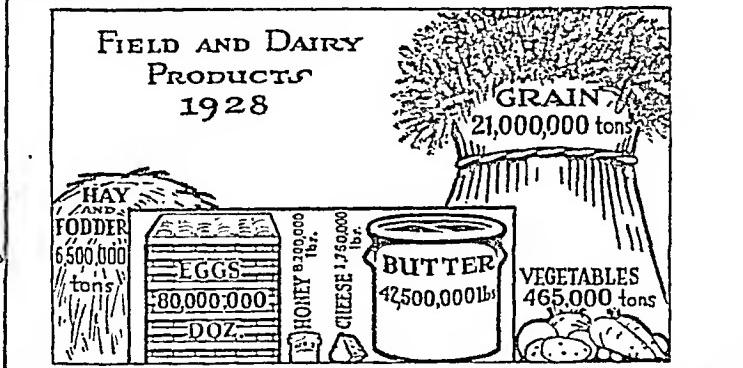


FIG. 318.—Diagram illustrating the development of the prairies of Canada.

for cattle, but the animals are allowed to wander over large areas.

Over the whole of the prairies the winters are cold and the summers are warm or hot. Wheat can be grown (except in the south-west where it is too dry) wherever the temperature is 60° or more for at least three months of the year. In 1928, the Prairies of Canada, with only 2,000,000 people, sowed 23,000,000 acres of wheat and produced 500,000,000 bushels of wheat; the Province of the Punjab, with 20,000,000 people, sowed 7,000,000 acres

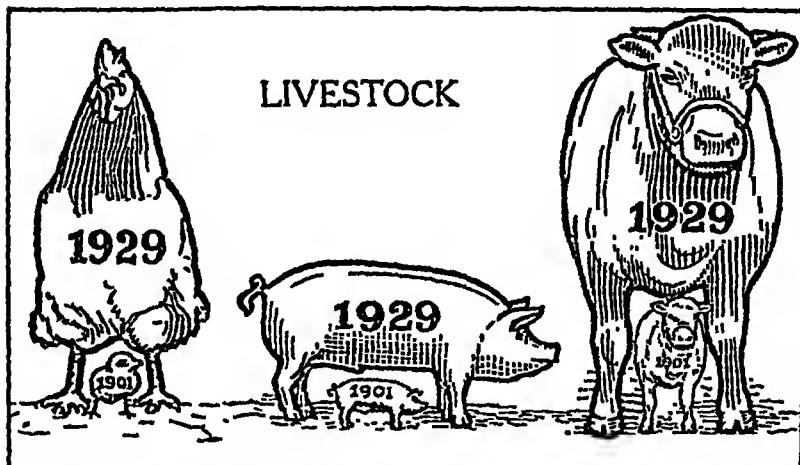


FIG. 319.—Live stock on the prairies.

	Horses.	Cattle.	Sheep.	Swine.	Poultry.
1901 .	339,989	941,625	189,665	200,281	1,717,019
1911 .	1,194,095	1,808,931	285,130	712,222	8,432,423
1923 .	2,328,851	3,747,722	469,570	1,677,784	19,020,966
1926 .	2,390,274	3,528,410	514,200	1,714,560	19,357,621

of wheat and produced 100,000,000 bushels. In this area, too, enormous quantities of oats and barley are produced and, on the poorer soil, rye. The oats and barley are often grown towards the north, in regions a little too cold for wheat. Another crop is flax, whilst large quantities of fodder are grown for feeding the cattle. Large numbers of eggs are produced, as well as butter. There are large numbers, too, of pigs. The Prairies of Canada

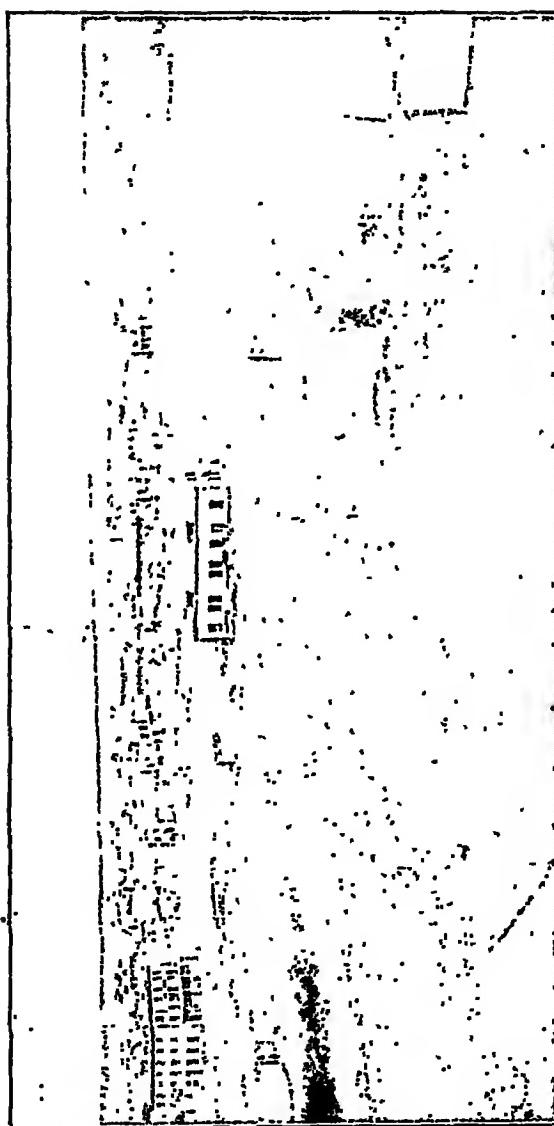


FIG. 220.—A typical prairie town in Canada.

Fig. 220.—A typical prairie town in Canada.  
Such towns commence by being just a small collection of wooden buildings. All around are the vast stretches of the prairies (Wainwright, Canada).

have been developed with great rapidity. In 1900 the area under crops was only one-tenth of what it is now ; the population only one-fifth ; there was not a single town with 50,000 people. The marvellous development

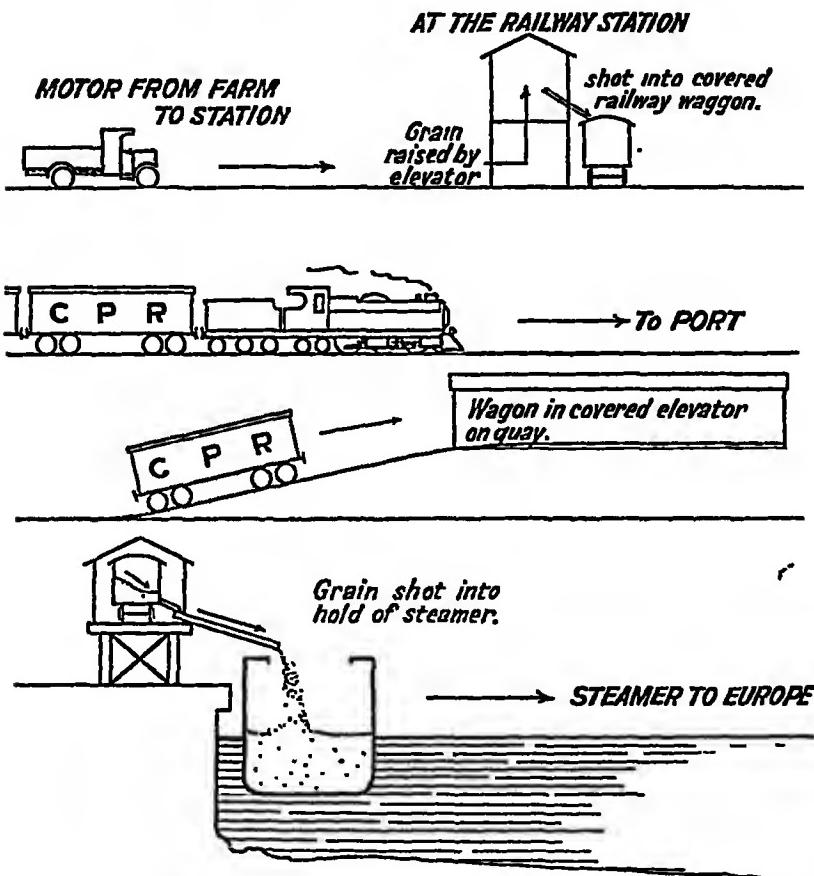


FIG. 321.—Diagram to illustrate bulk-handling of grain. Gunny bags from India are not needed.

has been made possible by the railways. The rivers of the prairies flow either towards the cold north or into Lake Winnipeg, and then through Nelson River into Hudson Bay. The entrance to Hudson Bay is frozen over for nine months of the year. So nearly all the grain has to

be sent to the great ports by railway. The grain is taken to the railway by carts or motors, and loaded into grain elevators. The grain is then shot into large railway trucks, and when the trucks reach the seaports the grain is shot straight into the steamer. There is no need to use bags at all. The towns of the prairies are grain-collecting centres—*Calgary* (the ranching centre), *Edmonton*, *Regina*,



[Photo: Canadian National Railways.]

FIG. 322.—Handling wheat in bulk—a grain elevator in Canada.

The wheat is collected from the prairies, stored in the big grain elevators, such as those shown in the picture. The wheat is pouring through the small black pipe and loading the wagon shown.

and *Saskatoon*. They have all appeared since 1900. The largest city of all, *Winnipeg*, is now about as large as Delhi: fifty years ago it had less than 1000 people. The two great railway systems are the C.P.R. and the C.N.R. (Canadian National Railways). There are few wooded areas on the prairies, but there are useful deposits of brown and other coal in several places and of enormous extent.

**The St. Lawrence Basin and the Atlantic Coast.**—The lowlands on either side of the St. Lawrence River, as well as the land north of Lakes Erie and Ontario, form another rich agricultural area. Unlike the prairies, these areas have been developed by white people for more than 200 years. This region forms part of the great provinces of Ontario and Quebec. Together with these may be taken the Atlantic provinces of New Brunswick, Prince Edward

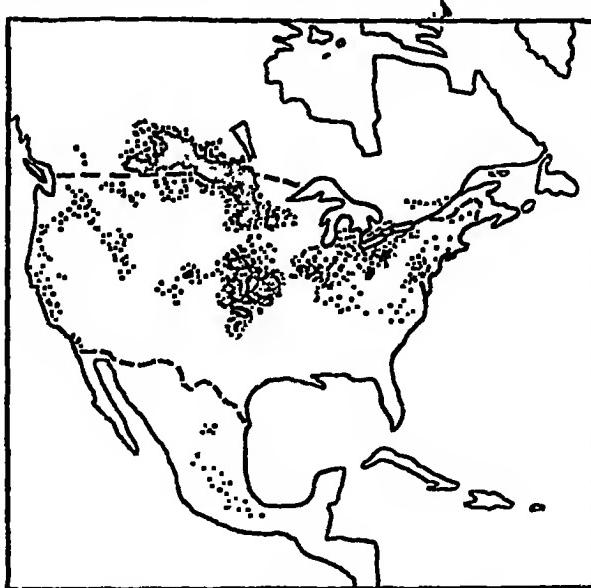


FIG. 323.—The wheatlands of America.

Notice that most of the wheat comes from the prairies of Canada and the United States.

Island, and Nova Scotia. Nearly three-fourths of the people of Canada still live in this region, but the population is not increasing as it is on the prairies. The natural vegetation is woodland or forest consisting of a mixture of coniferous and deciduous trees. The farming in this region is more like it is in England, and mixed farming is the rule. Oats, wheat, barley, and rye are all grown, as well as huge quantities of potatoes. More important still is dairy farming. More than half the cows of

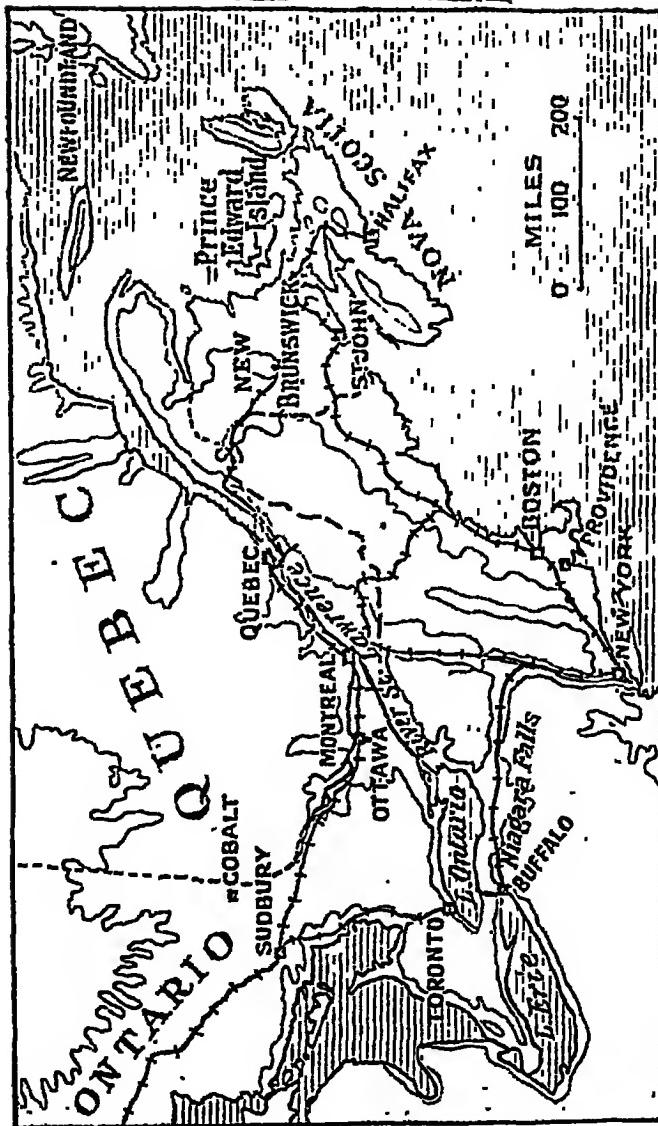
*North America*

FIG. 321.—The St. Lawrence Lowlands and New England. All land over 600 feet, dotted.

Canada are in this region, as well as two-thirds of the sheep, pigs, and poultry. The valleys of Nova Scotia, New Brunswick, and Ontario are celebrated for their fruit orchards, especially of apples. Along the sea-coast the fisheries are enormously important. Fishing is carried on both near the coast itself and farther out to sea on the Great Banks.

Nova Scotia and New Brunswick have important coal-fields, and produce half the coal of Canada.

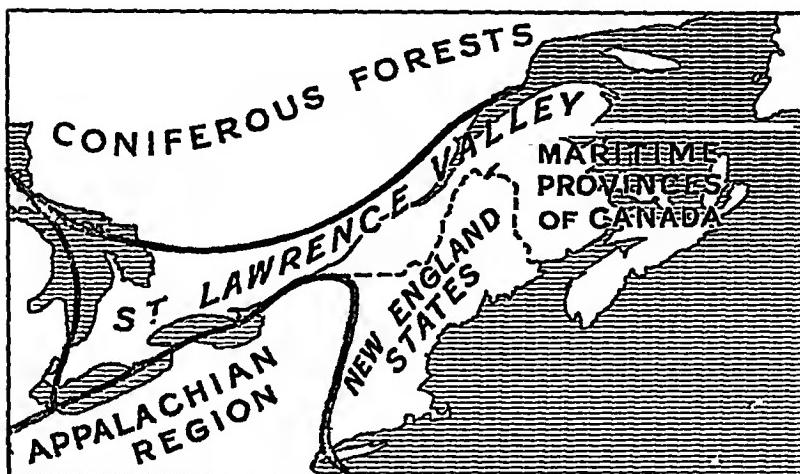


FIG. 325.—Key to the map of the St. Lawrence Lowlands, showing the natural regions.

Owing to the nearness to the sea the climate of this region is less severe than that of the prairies, but the Cold Labrador Current causes the winters to be cold. The St. Lawrence is blocked with ice for three or four months of the year, so that the ports of Montreal and Quebec cannot be used, but the Atlantic ports of Halifax and Saint John are open all the year.

The manufactures of Canada are nearly all in this area. Ottawa, the capital of Canada, is the centre of the pulp, paper and timber industry; Montreal, the largest city, with 10 lakhs of people, has many factories; Quebec

makes leather and cotton goods : *Toronto* has iron and steel and cloth works, and uses power from the Falls. This region adjoins one of the industrial districts of the United States and shares in some of the trades, e.g. the manufacture of motor-cars.

Canada is now a very important manufacturing country—the second most important (after Britain) in the British Empire and sixth in the world.

The River St. Lawrence is navigable by ocean steamers as far as *Montreal*. From there smaller steamers can go through Lake Ontario, the Niagara Canal, Lakes Erie and Huron, through the Soo Canal to Lake Superior, thus

WHEAT & FLOUR	WOOD & PULP	IRON	METALS	GOLD	CHEESE	MEAT	FURS	FISH	OTHERS	PAPER	MOTORS	OTHERS
RAW MATERIALS & FOOD												

FIG. 326.—The exports of Canada.

COTTON	RICE	TEA	JUTE	OIL SEEDS	WHEAT	WOOL	SKINS	METALS	OTHERS	JUTE	COTTON	OTHERS
RAW MATERIALS & FOOD												

FIG. 327.—The exports of India.

Both are agricultural countries but the exports of Canada are now of greater value than those of India.

reaching Fort William or Port Arthur, two great grain ports not far from *Winnipeg*.

Trade of Canada.—Canada is still largely an agricultural and mining country. Like India, it exports food to feed the countries of Europe and imports manufactured goods. Look at Fig. 326 and compare it with Fig. 327 showing the exports of India. The value of the trade of Canada is now more than that of India. Notice the largest ports. In the west the chief is *Vancouver*; in the east are *Montreal*, *Saint John*, *Halifax*, and *Quebec*.

An attempt is being made to develop *Churchill* on *Hudson Bay*; it is the nearest port to the wheatlands.

but the entrance to Hudson Bay is only free from ice for a few months of the year.

30 to 40 per cent. of the exports go to Great Britain, 40 per cent. to the United States ; of the imports 17 per cent. come from Great Britain, 65 per cent. from U.S.A. There is very little trade between India and Canada. Both are agricultural countries and they are very far apart.

#### QUESTIONS AND EXERCISES

1. Describe a journey across Canada by the C.P.R.
2. Give an account of the ports of Canada and their trade.
3. Compare and contrast British Columbia and Scandinavia.
4. Write an account of the lumbering industry of Canada.
5. What mining industries exist in Canada, and where ?
6. Describe a year in the life of a farmer on the Prairies.
7. In what ways do you think Canada will progress in the future ?
8. Describe and account for the position of the following towns : Winnipeg, Montreal, Calgary, Halifax, and Churchill.

### THE UNITED STATES OF AMERICA

The great republic known as the United States of America was founded by the "Declaration of Independence" in 1776. It is roughly the same size as Canada, but is situated almost entirely in the Temperate Zone, and has 112,000,000 people, against Canada's 10,000,000. It is thus twice the size of the India Empire, and has about one-third of the people. About 250,000 people are American Indians, descendants of the original natives of the continent; 10,000,000 are Negroes, descendants of slaves brought originally from Africa, whilst the remainder are white people who have left the crowded countries of Europe during the last 300 years and settled in the new land. The U.S.A. have vast natural resources of coal, oil, metals, and land, and have become one of the richest nations in the world.

We may divide this vast country into a number of natural regions :

- (a) The North-Western Pacific Coast, joining and really forming part of the Pacific Coast Region of Canada.

- (b) The Mediterranean Region.
- (c) The Rocky Mountain Plateaux.
- (d) The Interior Grasslands.
- (e) The South-East.
- (f) The Appalachian Region.
- (g) The New England Region.

**The North-Western Pacific Coast.**—We learnt under Canada of the valuable forests of the Rocky Mountains, and

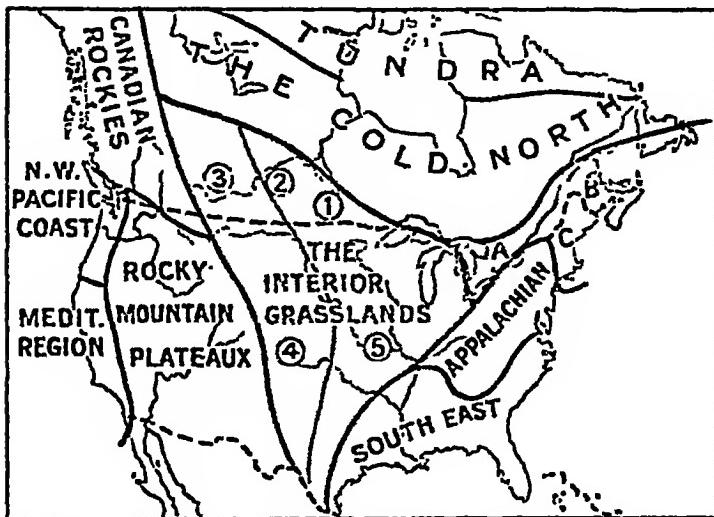


FIG. 328.—The natural regions of the United States and part of Canada.  
The Prairies of Canada : 1 The Low Prairies ; 2 The Middle Prairies ; 3 The High Prairies. The Prairies of the United States : 4 The High Prairies, including the Bad Lands ; 5 The Mississippi Basin. North-Eastern America : A, The St. Lawrence Valley ; B, The Maritime Provinces of Canada ; C, The New England States.

the rich sheltered valleys in the south of British Columbia. This region extends into the United States. There is one large valley, the Puget Sound, which grows fruits similar to those of British Columbia. The forests of Douglas Fir are extensively worked. Coal occurs. In this region is the port of Seattle (see Fig. 317), which has a large trans-Pacific trade, as well as a trade with the U.S. possession of Alaska in the cold north. Notice in your atlas the rail-

way routes threading their way across the plateau from this region.

**The Mediterranean Region.**—We have learnt that a



FIG. 320.—The coalfields of America.

1—Nova Scotia; 2—Pennsylvania; 3—Southern Appalachian; 4—Illinois; 5—Kansas-Oklahoma Fields.

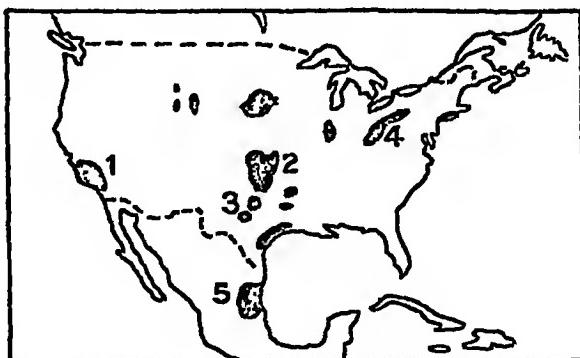


FIG. 330.—The oilfields of America.

1—The Californian Fields; 2—Mid-Continent Fields; 3—The Texas Fields; 4—Appalachian Fields; 5—Mexican or Tampico Fields.

part of the Pacific coast of America receives its rain in winter and has hot summers. This "Mediterranean Region" stretches from the borders of Mexico ( $32^{\circ}$  N.) to about  $42^{\circ}$  N., and includes the greater part of the State of California. The region is bounded inland by the lofty crest of the Sierra Nevada. Along the coast runs the Coast

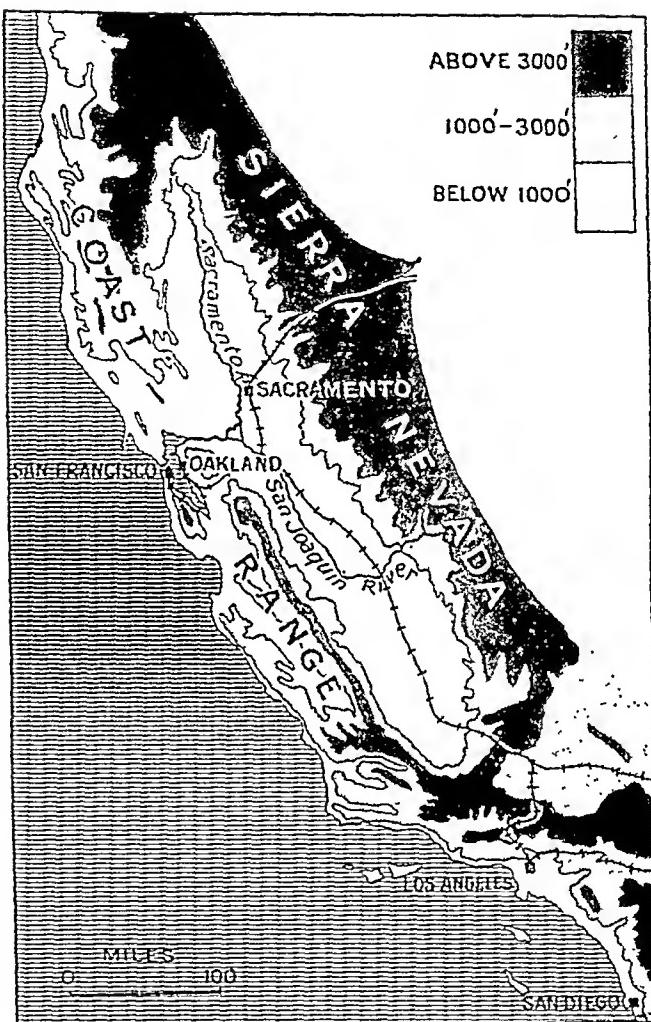


FIG. 331.—The Mediterranean region of America.

Notice that only one railway goes directly eastwards from San Francisco across the Sierra Nevada.

Range. Between the Sierra Nevada and the Coast Range is the great valley of California. The valley is drained by two rivers—the Sacramento in the north, and the San Joaquin in the south. The Coast Range has been broken through at one point, giving access to the valley from the Pacific Ocean. Guarding this gap is the great port of San Francisco. The Coast Range gets a good rainfall, but the valleys are sheltered and dry. Large tracts are now irrigated and used for fruit farming. Wheat and barley are grown, but California is famous for its fruits, and the fruit-tinning industry is an important one—peaches, apricots, pears, plums, cherries, etc., are all grown and tinned. Equally important are the fresh “citrus” fruits—oranges, lemons and grape-fruit, which are sent to all parts of North America. *Sacramento* is an important town in the valley, but a far larger town is *San Francisco*. In the south of the region are some of the largest oilfields in the United States—centring round the town of *Los Angeles*. This area alone produces forty times as much mineral oil as the whole of India. Gold and other minerals are found in the Sierra Nevada. *Los Angeles* is also the centre of the bioscope-film industry, and has grown very rapidly. It is now larger than *San Francisco*.

Notice the two main railway lines which connect California with the eastern states. The railways start from Oakland opposite the port of *San Francisco*.

**The Rocky Mountain Plateaux.**—As we come southwards from Canada the Rocky Mountain System becomes very broad, exceeding 1000 miles, and occupies nearly one-third of the whole of the United States. On the west is the Sierra Nevada and the Cascade Range, on the east the Rocky Mountains themselves. Between the two is a series of lofty plateaux, separated by ranges of mountains. The two largest plateaux are the

- (1) Columbia Plain and Snake River Plateau in the north.
  - (2) Colorado Plateau in the south.
- Between these two is the smaller plateau of Utah.

The plateaux are cut off from the Pacific Ocean by the Sierra Nevada, and from the Atlantic Ocean by the Rocky Mountains, with the result that they are very dry. The greater part is occupied by desert or semi-desert. The mountain ranges have a heavier rainfall owing to their

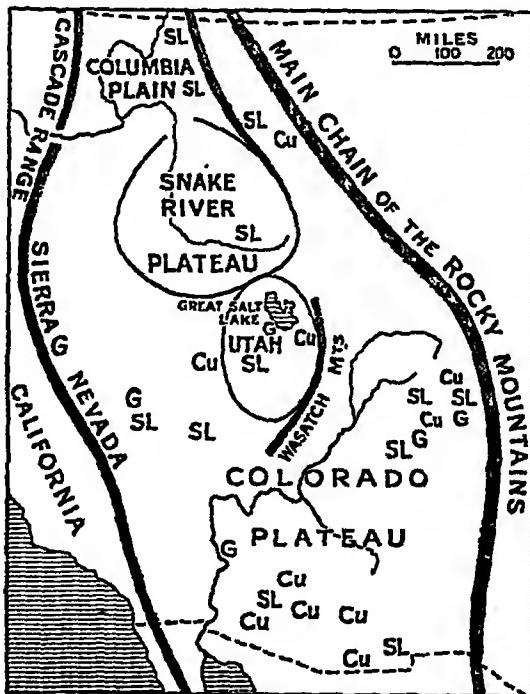


FIG. 332.—The Rocky Mountain Plateaux.

Cu=Copper; S=Silver; L=Lead; G=Gold.

great height, and are often forested. The plateaux get very cold in winter, but are cut off from the influence of the sea, and suffer from great heat in summer.

*The Snake River Plateau* is formed of great sheets of lava which weathers to a sticky black soil like the Deccan lavas of India. Most of the plateau is covered with a

poor grassland on which cattle graze, but large crops of wheat can also be grown even without irrigation.

*The Great American Desert* is a region of inland drainage, in the centre of which lies the Great Salt Lake of Utah. So shallow is this lake that a railway has been built across it. Salt Lake City was founded by the Mormons, a group of people with a curious religion of their own. Although situated in such a dry region it has grown to importance. An extensive irrigation system has been constructed and much sugar-beet is grown.

*The Colorado Plateau* is a great dry area, famous for the great canyon of the Colorado River. The river has cut a gorge, or canyon, 4000 feet deep through the soft rocks of the plateau. The sides are not washed away because so little rain falls in the region. The river gets its water from the Rocky Mountains.

Taking the Rocky Mountain Region as a whole by far the most important occupation is mining. This region produces more than three-quarters of the gold of the U.S.A., nearly all the silver, most of the copper, and most of the lead. Along the eastern borders coal occurs. Look at the sketch-map for the distribution of the minerals.

**The Interior Grasslands.**—Just as in Canada, the interior of the United States is flat or undulating land which slopes gradually downwards from the foot of the Rockies towards the east. The west is also much drier than the east, and we may divide the region into two parts :

- (a) The dry west.
- (b) The moister east, or valleys of the Mississippi and Ohio.

Look at the extent of these areas on the map.

*The Dry West* consists of poor grassland. Many of the rivers which flow down from the Rockies have cut deep valleys, and so cannot be used for irrigation. Millions of cattle wander about the region and find sufficient grass on which to live, but they are sent to the richer grasslands of the east before being killed for market. The greatest ranching state of all is Texas, where the grass is a little

richer and the climate less severe. The dry lands with deep river valleys are often called the "Bad Lands." At the foot of the Rockies is the town of *Denver*.

The *Mississippi Valley*, or North Central Region, is the great agricultural region of the United States. It is a continuation of the rich wheatlands of Canada. The climate is continental, but on the whole gets gradually warmer southwards. All over the north enormous quantities of wheat are grown, all over the south maize is the great crop. Flour milling has naturally become an important industry, the chief centres being *Minneapolis*, *Chicago*, and *St. Louis*. St. Louis is situated at the junction of the Missouri and Mississippi rivers, and is the highest point which can be reached by large steamers. Nearly half the cattle of the United States, and more than half the pigs, are found in the maize belt. Cattle from the drier western lands are fattened here. The tinning of meat is a very important industry at Chicago and *Kansas City*. *Chicago* produces more than a quarter of the whole supply of tinned meat of the U.S.A. *Indianapolis* is another important centre. In addition to its agriculture, this region has enormous mineral wealth. There are large coalfields and large oilfields. The coalfields are in the States of Illinois and Michigan; the oilfields in Ohio, Illinois, and Kansas. The part of this region which borders the Great Lakes consists of old hard rocks like the Laurentian Plateau of Canada. These old rocks are very rich in minerals. Eighty-five per cent. of the iron ore of the United States comes from west of Lake Superior in *Minnesota* and is shipped at the port of *Duluth*. The ore is taken to other towns on the Great Lakes where coal is available. Some is smelted at *Chicago* and *Milwaukee*, but more on the borders of Lake Erie, where coal from Pennsylvania can be obtained. The town of *Detroit*, near Lake Erie, is the fourth largest city in the States, and is engaged in the manufacture of motor-cars. Great deposits of copper are found on the shores of Lake Superior in the State of Michigan.

Various towns in this region make agricultural machinery for use in the region itself. Round the Great Lakes there are forests, and timber is worked mainly for wood-pulp and paper manufacture.

It will be seen that this region of the United States is very rich, and forms one of the world's greatest agricultural and industrial regions. The Great Lakes form a great highway in the north ; the Mississippi and its tributaries in the south. Even more important is the great network of railways. *Cincinnati*, in the State of Ohio, is an important railway centre.

In the south of this region is a small plateau of old rocks, called the Ozark Plateau. It is rich in minerals—iron, lead, and zinc.

The South-Eastern Region comprises the lowlands round the Gulf of Mexico and the Atlantic Coastal Plain. This region enjoys a good rainfall and a warm, even climate. The coldest month is well above freezing, whilst the summer months are as warm as they are in most parts of India. Most of the rain comes in the warm part of the year, so that the climate is a little like that of India. The effect of this is seen in the crops. This is the greatest cotton-growing region in the world, and produces more than half the world's supply of raw cotton. The cultivation of cotton has gradually spread over nearly all the suitable land, so that in the future to get more cotton it will be necessary to improve the yield—that is, to get more cotton from the same area of land. The cotton grown is the good American upland cotton, which in India only grows on the best irrigated land. The most important food grain in this region is maize, which occupies more land than wheat. Large quantities of rice are also grown, sufficient for the needs of the whole of the U.S.A. Sugarcane is also grown. Forests still cover considerable areas. In this hot part of America most of the workers in the fields are negroes. A hundred years ago the negroes were slaves brought from Africa, but now they are all free men. The great town and port of this region is New Orleans,

on the River Mississippi. The Lower Mississippi and its tributary the Red River form important highways, but now a great network of railways covers the country ; large quantities of raw cotton are sent to England from the ports of New Orleans and Galveston. The Peninsula of

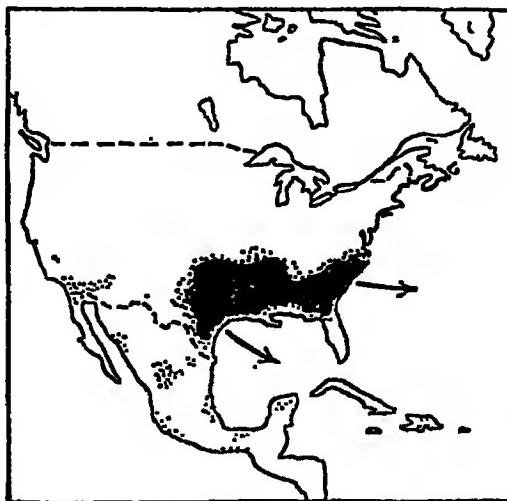


FIG. 333.—The cotton lands of America and the world's production of raw cotton (excluding China).

Nearly two-thirds of the world's supply come from the United States. The arrows show the routes by which the cotton is exported (from Galveston and Savannah and other ports) to England.

Florida does not grow cotton ; it has a delightful climate and is a favourite holiday resort. A large town is *Miami*.

The Appalachian Region consists of mountains, hills, and plateaux, stretching from the Lake Ontario and Lake

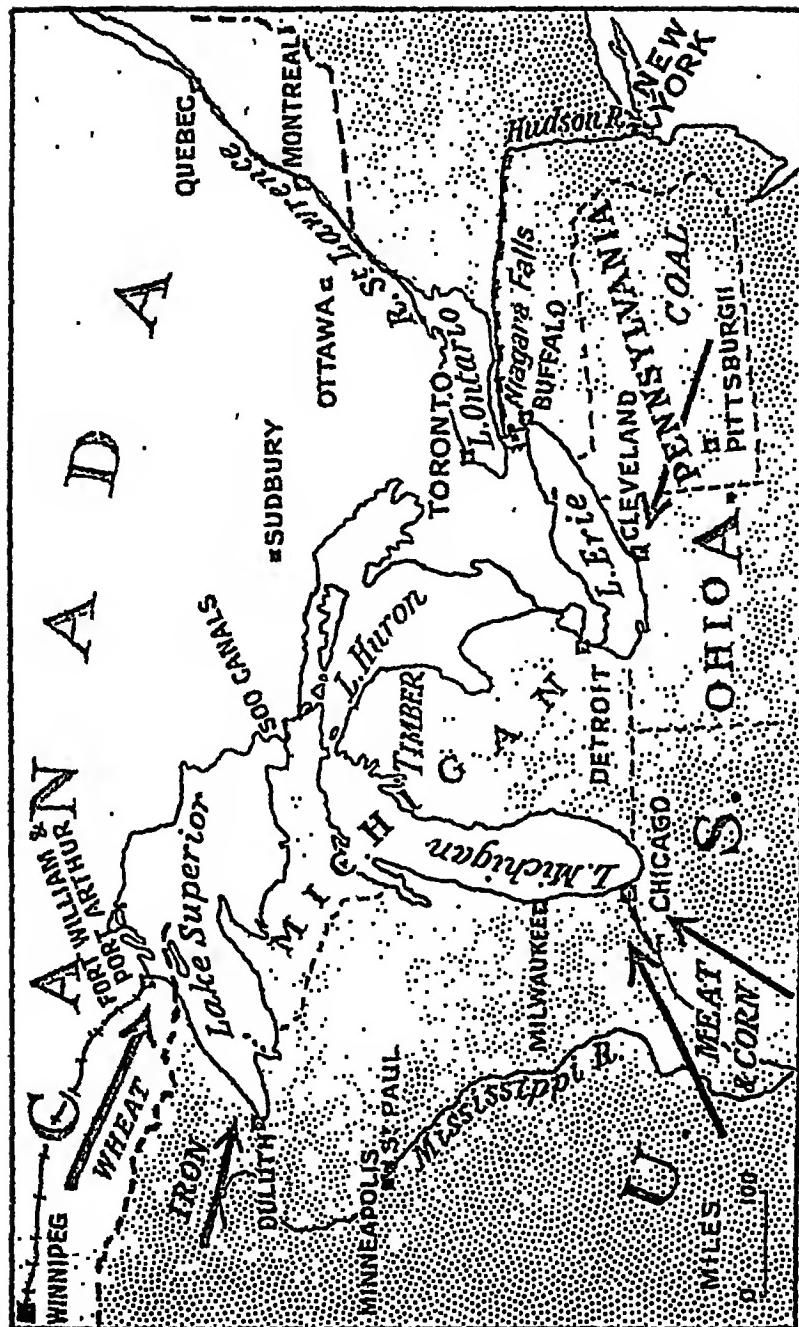


FIG. 334.—The Great Lakes.  
This wonderful series of waterways is frozen over from December until April or May. Notice the scale and measure the distance from Duluth to New York by water.

Erie south-westwards. At the northern end the hills are close to the Atlantic Ocean, but farther south they are separated from the sea by the coastal plain already described. This very important region contains more than one-third of the total population of the U.S.A. Much of the land is too hilly to be cultivated, but there are numerous

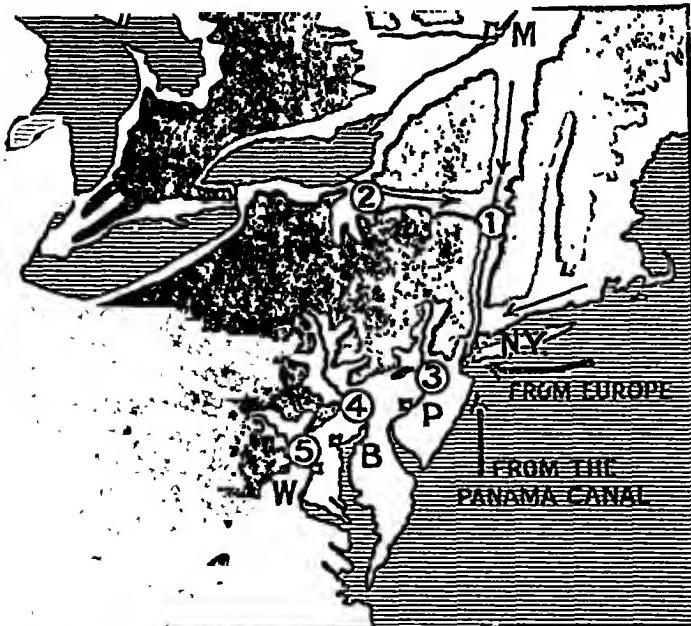


FIG. 335.—The position of New York, at the entrance to the Hudson—Mohawk Gap. All land over 600 feet, black.

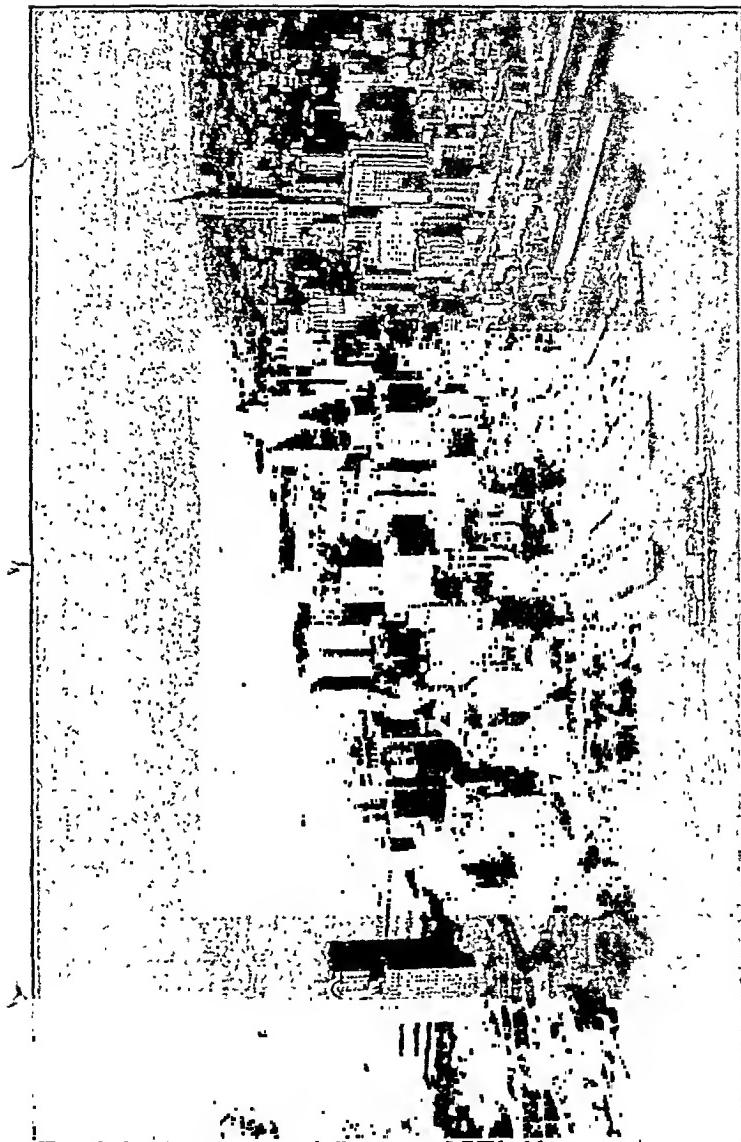
1—The Hudson River; 2—The Mohawk Gap; 3—The Delaware Gap with Philadelphia (P); 4—The Susquehanna Gap with Baltimore (B); 5—The Potowmack Gap with Washington (W). Notice that the Hudson-Mohawk is the only complete gap affording access to the Great Lakes and also directly northward to Montreal (M). No less than two canals and four main railways run down the narrow Hudson Valley to New York.

sheltered valleys where mixed farming and dairy farming can be carried on. But this region has enormous supplies of coal—especially in the north where the Pennsylvania coalfield produces as much coal as the whole of the British

Isles, and more than half the total obtained in the States. Some of the coal is exported *via* the Great Lakes to Canada, or through the river gaps (Delaware, Susquehanna, Potomac) to the ports of Philadelphia, Baltimore, etc. A great iron and steel industry has grown up on the coalfields. At first local iron ores were used, but now the ore is brought from Lake Superior. The great centres are *Pittsburg*, *Homestead*, *Cleveland*, and *Buffalo*. Notice that the last two are on the lake shores. The manufacture of woollen goods is centred round Philadelphia, whilst silk goods are made in the States of Pennsylvania, New Jersey, and New York. Clothing is made especially in New York. A considerable amount of paper is made from the trees of the hilly regions. Notice carefully the wonderful position of *New York* as one of the outlets of this region, and also of *Newark*, *Jersey City*, *Philadelphia*, and *Baltimore*.

*Washington*, the beautiful capital of the United States, is on the Atlantic border of this region.

**New England.**—The New England States adjoin the Maritime States of Canada, and occupy the extreme north-east of the U.S.A. This was the part of America where the first colonists settled. They carried on farming in the valleys and lowlands near the coast. This is still a region of mixed farming similar to that of the British Isles. But the colonists brought various trades with them, and gradually industries sprang up. The moist climate was suitable for cotton manufacture; plenty of water and water power was available. Many of the towns are situated on what is called the "Fall Line," where the rivers come tumbling down from the mountains to the plains. Coal is available from Nova Scotia and Pennsylvania; there are good ports facing the busy countries of Europe. So nearly two-thirds of the cotton goods of the U.S.A. are made in this region—at Fall River, Manchester, Providence, etc. Very important, too, are woollen manufactures. Boston is the great wool market of America. Boots and shoes are also made in this area. There is little iron ore available, but small articles such as cutlery and hardware, as well as



*Photo: Central Aeroplane Co., Ltd.*

FIG. 336.—An aerial view of the southern end of New York City.

Notice that New York is hemmed in by water on both sides and cannot expand laterally. Hence the very tall "skyscrapers." Compare this with London.

brass work, etc., are made in this region. Large areas of New England are still forested, and nearly half the wood paper of the U.S. comes from this region. Fishing is still very important along the coasts.

*Boston* is the principal port of the region.

**Alaska.**—In the north-west of the American continent, the large territory of Alaska belongs to the U.S.A. It is a large area, nearly half the size of India, but too cold to be of much use. It has, however, valuable minerals and produces large quantities of gold and copper. Notice the course of the Yukon River, which is open to traffic for two or three months of the year. The principal port of Alaska is *Skagway*, from which a railway runs inland. Along the coast salmon fishing is important.

**Trade of the United States.**—The United States form such a huge territory, and have such a range of climates and productions, that they could be almost self-supporting. But the United States have a huge foreign trade—about the same in value as that of the British Isles. The imports

RAW COTTON	OIL	GRAINS	IRON & STEEL	TOBACCO	WOOD	MEAT	COAL	MACHINERY	MOTORS	COTTON GOODS	METAL GOODS	VARIOUS
RAW MATERIALS	MANUFACTURES											

FIG. 337.—The exports of the U.S.A.

CANE SUGAR	RAW SILK	COFFEE	RUBBER	WOOL	PAPER	WOOD	JUTE	HIDES & SKINS	VARIOUS
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FIG. 338.—The imports of the U.S.A.

The total trade is about four times that of India or Canada.

are mainly raw materials which are produced in countries having a warmer climate than the U.S.A.—cane sugar, coffee, rubber, silk, jute, etc. The exports are both agricultural products and manufactured goods. By far the

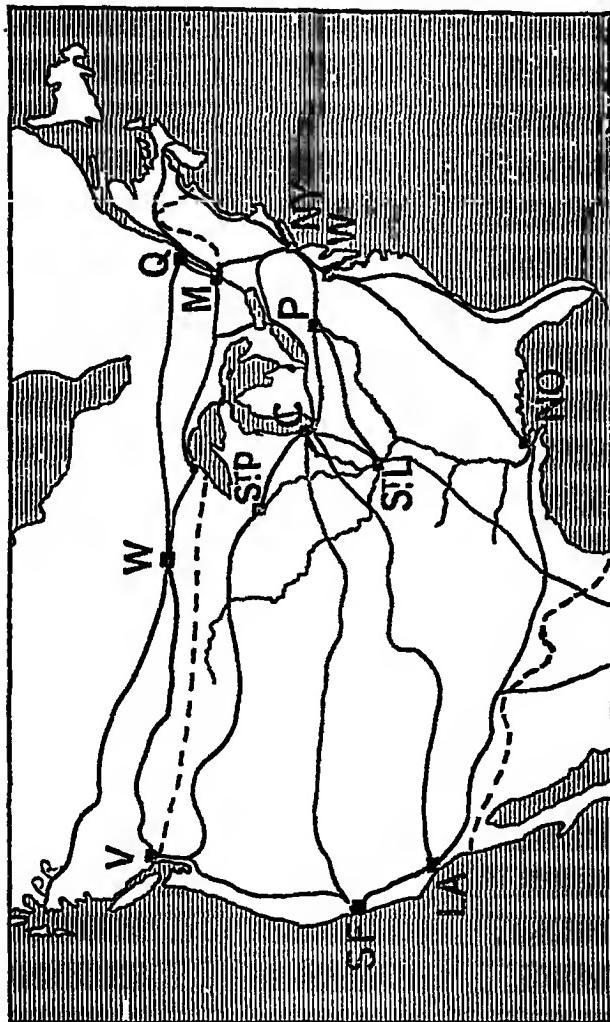


FIG. 330.—The communications of North America.  
Notice that there are two main trans-continental railways in Canada and four in the U.S.A.

most important is raw cotton—sent largely to Great Britain, France, and Germany. Study Figs. 337 and 338 carefully.

**Trade between India and the U.S.A.**—In 1924–25 nearly one-tenth of all the exports of India went to the United States, whilst more than one-twentieth came from the States. This is remarkable when we remember that the United States are so very far away from India. India sells to the U.S.A. goat-skins and sheep-skins, lac, manganese ore, mica, castor-oil seeds, spices, tea, and above all, raw jute and jute cloth. India buys in exchange iron and steel goods, machinery (including motors), and hardware, mineral oil, and tinned goods.

**Communications.**—The United States have two great systems of inland waterways. One is the Great Lakes System. Lakes Superior and Huron are joined by the "Soo" Canal—the total tonnage of vessels passing through this canal is three times that passing through the Suez Canal. It has been mentioned under Canada that there is a canal between Lakes Erie and Ontario, so that vessels can pass right from Lake Superior to the Atlantic Ocean. But only the smaller ocean vessels can do this. The Erie Canal connects Lake Erie with the Hudson River and so with New York, but it is too small for modern needs.

The Mississippi and its tributaries form the other great water highway. But it flows southwards and most of the trade is from west to east.

The United States have a quarter of a million miles of railway—the American railways are long enough to go round the world at the equator ten times. Just as in Canada, the agricultural development followed the railways—the railways made it possible.

#### QUESTIONS AND EXERCISES

1. Write as full an account as you can of the mineral-oil industry of the U.S.A.
2. Compare the Interior Grasslands of U.S.A. with those of Canada.
3. Give an account of the coal and iron fields of North America.

4. Compare carefully the Mediterranean Region of North America with that of Europe.
5. Account for the importance of each of the following (see sketch-maps): New York, Chicago, Duluth, Salt Lake City, Los Angeles, and Seattle.
6. Describe, and account for, the Great Salt Lake.
7. Draw a section across the United States from San Francisco to New York, marking the principal occupations of the people along the line of section.
8. Compare the cotton-growing industry of the United States with that of India.
9. Draw a sketch-map of the Great Lakes, marking important towns and lines of communication.
10. Describe as fully as you can the New England States, their people and occupations.
11. How can the Panama Canal affect the trade between India and the United States?
12. Write an account of the import and export trade between San Francisco and Asia.

## MEXICO

Mexico is a large republic, nearly half the size of India without Burma, and with a population of fourteen millions. Mexico was a colony of Spain from 1521 to 1822, and most of the inhabitants are descended from Spanish settlers and from the native American Indians. The country is very unsettled, and there have been many revolutions within the last hundred years.

Mexico consists of a broad high plateau, a continuation of the Rocky Mountain Plateaux of the U.S.A., with a coastal plain on either side. On the west is the long mountainous peninsula of Lower California, in the south-east is the lowland peninsula of Yucatan. The Tropic of Cancer runs right through Mexico, so the coastal plains are hot and enjoy a good rainfall. The slopes of the plateau are cooler, but attract a good rainfall. But the surface of the plateau is 4000 to 8000 feet above sea-level, and sheltered from the influence of the sea. The days are hot and the nights cold; there is a great difference between summer and winter. The plateau gets particularly hot when the sun is overhead and a small monsoon is caused,

bringing rain from east and west in the summer. Lower California is in the desert belt and remains dry.

The Tropical Coastlands are suitable for cane-sugar, rubber, vanilla, and tobacco, and in settled times good crops are obtained. Sisal hemp comes from Yucatan.

The Temperate Hill Slopes produce good coffee and large quantities of maize, which is the staple food of the people. Where the rainfall is poor, small tracts are irrigated.

The Plateau usually suffers from poor rainfall and irrigation is usually needed for cotton, wheat, and maize. Many sheep and cattle are reared.

Mexico is famous for its mineral wealth. Mexico produces nearly half the world's silver and huge quantities of copper. There are also deposits of iron and coal. These minerals come from the plateau, especially near Mexico City. On the flanks of the mountains are the famous oilfields which were first worked about 1910. Mexico produces about 8 per cent. of the world's supply, or nearly ten times as much as India. Tampico is the great oil port. Mexico has not yet developed many industries. Hydro-electric power is available, and a few cotton goods are made at Vera Cruz. Mexico is the largest city, capital of the republic and near the important silver-mining regions.

## CENTRAL AMERICA

Central America consists of the six small republics of Guatemala, Salvador, Honduras, Nicaragua, Costa Rica, and Panama, with the British Colony of Honduras. A broad backbone of mountains runs through the countries; it narrows gradually to a single chain in the Isthmus of Panama. There is a narrow coastal plain on either side of the mountains. The rainfall on the Atlantic side, being derived from the Trade Winds, is heavier than on the west. As in Mexico, it is possible to distinguish:

(a) Tropical plains, producing sugar, bananas, coconuts, and hard timbers.

(b) Temperate hill slopes, producing coffee.

(c) Cool grass-covered highlands.

As in Mexico, the inhabitants are of Spanish-Indian descent,

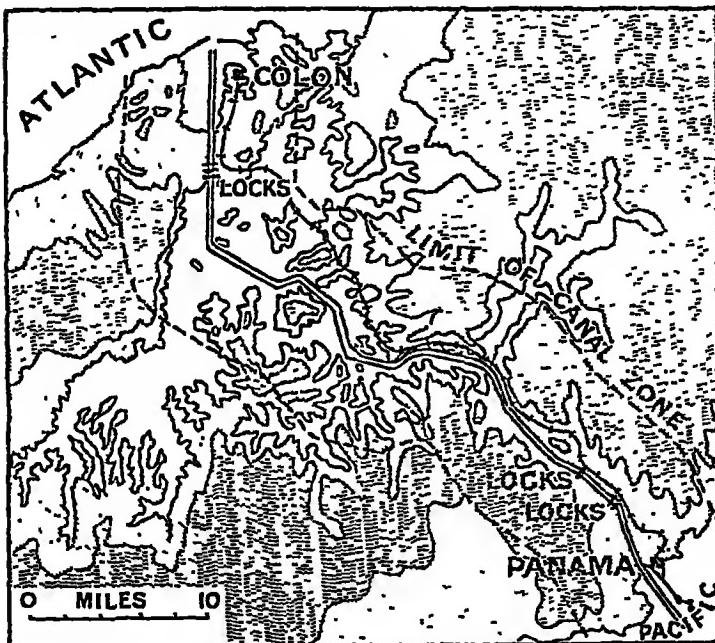


FIG. 340.—The Panama Canal.

Land over 300 feet, heavily dotted; land below 300 feet, lightly dotted. Notice the hilly nature of the Isthmus, the curved course of the canal and the three locks at each end.

The Republic of Panama occupies the narrowest part of the isthmus between North and South America. Many years ago the Frenchman who built the Suez Canal tried to construct a canal across the Isthmus of Panama, but he failed. In 1904 the United States purchased a strip of land ten miles wide from Panama and spent 150,00,00,000

rupees (one hundred and fifty crores of rupees) in building the Panama Canal. The canal was finished in 1914. The canal belongs to the United States, but it may be used by vessels of all nations on equal terms. In 1924 over 5000 ocean steamers went through the canal, mostly American and British. The canal is about thirty-six miles.

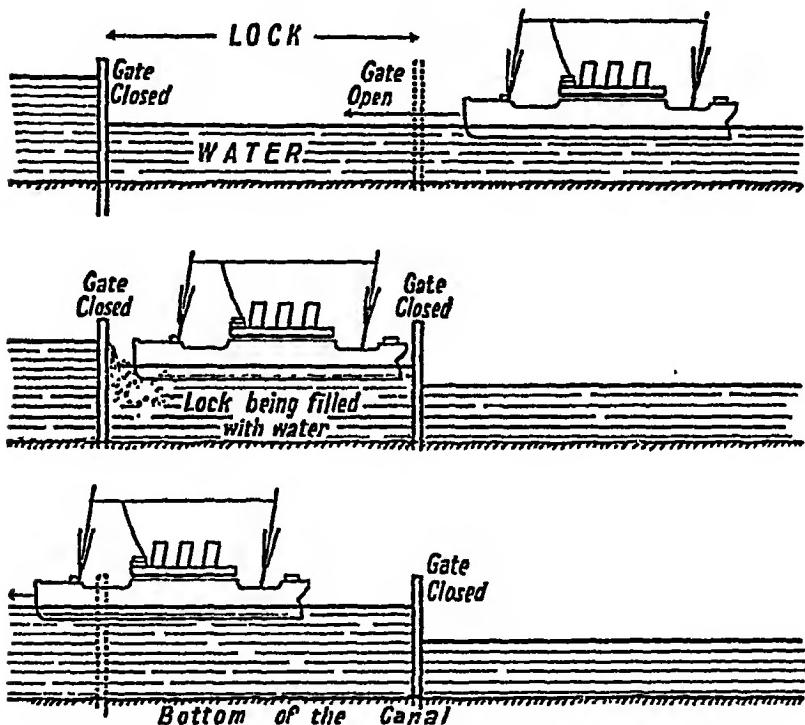


FIG. 341.—Diagram to show how a lock on a canal is worked.

long, but for more than half the distance it runs through an artificial lake. The Panama Canal was much more difficult to construct than the Suez. The Suez Canal passes through flat land, but the Panama Canal has to cross a ridge of hills. This it does by means of locks. The town at the northern or Atlantic end is *Colon*; at the southern or Pacific end is *Panama*.

## QUESTIONS AND EXERCISES

1. Draw a section across Mexico showing the natural regions.
2. Study the climate of Central America and then say what products can be obtained from these states which the United States has not.

## THE WEST INDIES

The West Indies were so called because they were discovered by Columbus when he was trying to find a new ocean route to India. He thought he had reached a part of India. They consist of four large islands and a large number of small ones. Nearly the whole of the group lies within the Tropics.

Cuba is a republic but has been greatly developed by the United States. So that now Cuba produces one-third of the world's supply of cane-sugar. The sugar is exported to the United States. Cuba is also famous for its tobacco, exported from the capital and principal port of Havana.

Porto Rico is a much smaller island, belonging to the U.S.A., and again sugar-cane and tobacco are the leading products—together with some coffee.

Haiti (or Hispaniola) is divided between two Negro republics—the Negroes being the descendants of liberated African slaves. Both republics are very undeveloped.

Jamaica, part of the British Empire, is famous for its cane-sugar and bananas, which are exported through the ports of Kingston and Port Antonia.

The smaller islands of the West Indies, known as the "Lesser Antilles," belong mostly to the British Empire, though some are French. They nearly all produce cane-sugar, some limes, and sea-island cotton. The island of Trinidad really belongs to South America and produces large quantities of mineral oil and pitch. The pitch is obtained from the famous "pitch lake," and it is valued for "tarring" metalled roads. Although such a small island, Trinidad produces nearly half as much oil as Burma.

## QUESTIONS AND EXERCISES

1. Why is the Atlantic the busiest ocean in the world ?
2. Write a brief account of the climate of North America.
3. What are the principal trans-continental railways of North America ? Which do you think is the most important, and why ?
4. Write a description of transport in North America other than railway. Draw a sketch-map to illustrate your answer.
5. Why are the eastern coastlands the most developed region of the continent ?
6. Do you consider Cuba to be of importance to the United States ? Give reasons.
7. Give a full account of the Appalachian System using the headings : Position, Structure, Vegetation and Products, Occupations of the People.
8. Divide North America into natural vegetation belts, describing each one briefly.
9. Describe and account for the deserts of North America.
10. How far can India and United States be considered rivals as far as their exports are concerned ?
11. Compare and contrast New Orleans and Montreal as important ports of North America.
12. Write an account of the trade between Great Britain and (a) Canada, (b) United States.
13. If you were emigrating to North America in which part would you choose to settle, and why ?
14. What possibilities of development are there for the Cold Northern Region ?
15. What were the geographical causes of the struggle between England and France during the first settlement of North America ?

## D. SOUTH AMERICA

### 1. POSITION AND SIZE

SOUTH AMERICA has an area of about 7,000,000 square miles, or roughly four times the size of the whole of India. Notice that the equator passes through the mouth of its greatest river, the River Amazon. The Tropic of Capricorn passes roughly through the middle of the continent, but the whole continent is wedge shaped so that more than two-thirds of its area is within the tropics—that is, north of the Tropic of Capricorn. Try and note the position of longitude  $60^{\circ}$  W. as being a central meridian for the continent. South America is almost an island, being joined to North America by the narrow Isthmus of Panama which has, indeed, now been cut through by the Panama Canal.

### 2. PHYSICAL FEATURES

Notice that South America has few indentations in its coast. With the exception of Africa, it has the least length of coast line for its size of all the continents. Study Fig. 343 and see how South America falls into a few well-defined physical units. These are :

- (1) The narrow coastal plain bordering the Pacific Ocean.
- (2) The great fold range of the Andes—broad in the north and consisting of several ranges with plateaux in between, but narrowing to one main range in the south.
- (3) The great plains.
- (4) The eastern highlands—formed of two plateaux

of old hard crystalline rocks, separated by the Amazon River. The two plateaux are the Guiana Highlands in the north, and the Highlands of Eastern Brazil in the south.

In reality the Central Plains fall into four divisions from north to south :

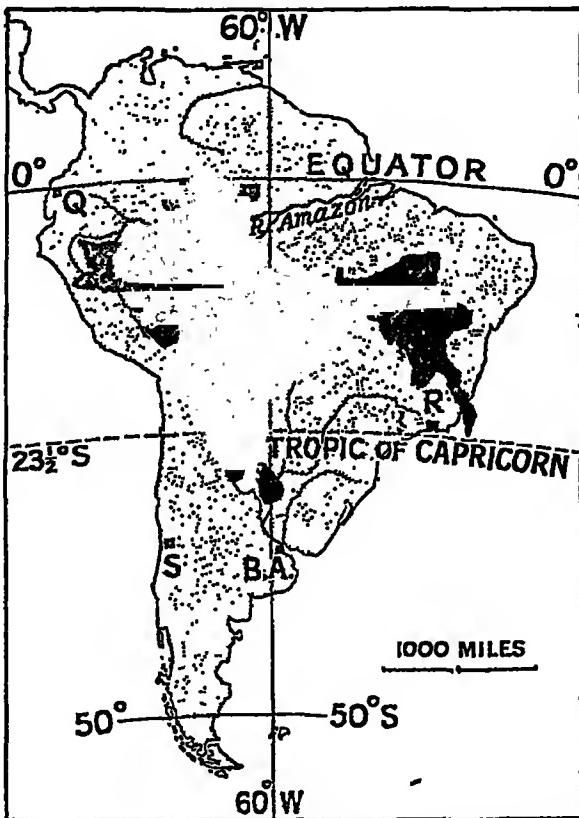


FIG. 342.—The position and size of South America.

- (a) The basin of the Orinoco (the Llanos, or grassy plains).
- (b) The great basin of the Amazon (the Selvas, or Equatorial Forests).
- (c) The basin of the Parana-Paraguay Rivers.
- (e) The Argentine Pampas and the Patagonian Desert.

Rivers.—There are five important river systems in South America ; one corresponding to each of the divisions of the Central Plains and a fifth system—that of the

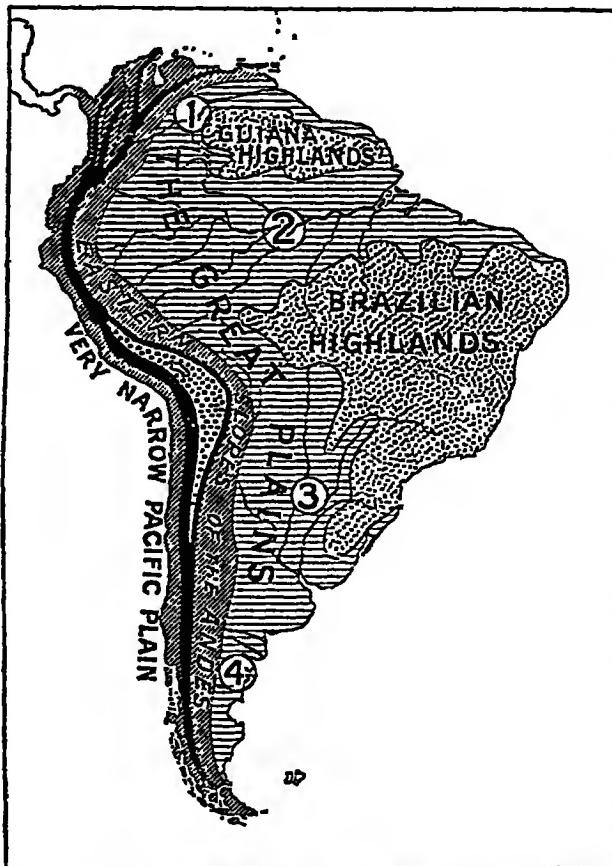


FIG. 343.—The main physical features of South America.

1—The basin of the Orinoco ; 2—The basin of the Amazon ; 3—The basin of the Paraná and Paraguay Rivers ; 4—The Argentine Pampas and Patagonian Desert.

Cauca and Magdalena—draining the northern ranges of the Andes.

### 3. GEOLOGY AND MINERALS

As we have learnt to expect, the minerals are associated with the old hard rocks and fold ranges. The Pacific coastal strip has a curious mineral industry which is, however, associated with its dry desert climate. That is the nitrate industry of Chili. The great fold range of the Andes was uplifted mainly in late geological times—in Tertiary times. Indeed some of its peaks are active volcanoes, the most notable being Chimborazo and Cotopaxi. Valuable deposits of silver, copper, and other metals occur in the older parts, especially in the broad high plateau of Bolivia. We have noticed in other parts of the world that oilfields are often found round the fringes of fold mountains. Such is the case in South America, and valuable oilfields have been found round the northern end of the Andes—in the Maracaibo Basin and in Venezuela.

### 4. CLIMATE

The climate of South America is controlled to a great extent by its physical features, but especially by the great chain of the Andes. In the northern two-thirds of the continent the rain-bearing winds are the Trade Winds—



FIG. 344.—Sections across South America from west to east.

blowing from the north-east and south-east. The Andes effectively drain these winds of their contained moisture, so that on the Pacific coastal strip there we find the curious feature of a long, narrow, almost rainless desert bordering the ocean. The southern third of the continent is under the influence of the North-Westerly winds of the cyclonic

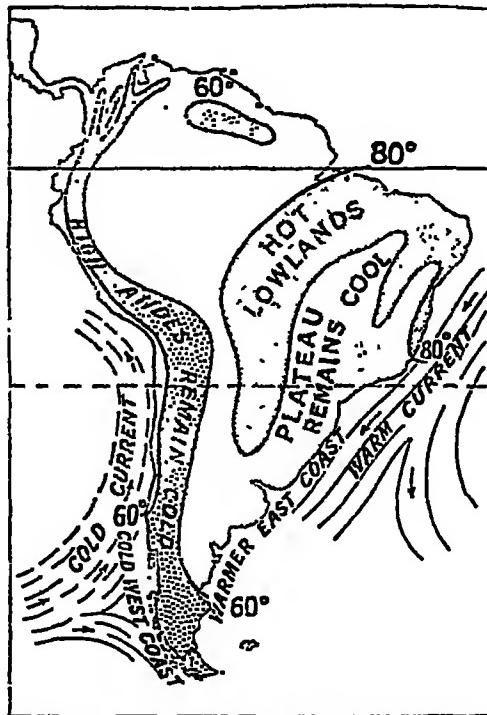


FIG. 345.—The temperature of South America in January (hot season).

belt, which bring abundant rainfall to the southern part of the Pacific coastal strip. The mountains again extract most of the moisture from the winds, so that here in the south we find desert again, but this time on the Atlantic side of the Andes—the Patagonian Desert. You will remember that in Europe and other parts of the

world the Mediterranean type of climate is found just where the belts of the Trade Winds and Anti-Trades meet. When the sun is in the south—that is, shining over the southern Tropics—there is a strip of the western coast which is under the influence of the Trade Winds—dry because they have passed over the Andes. But when the

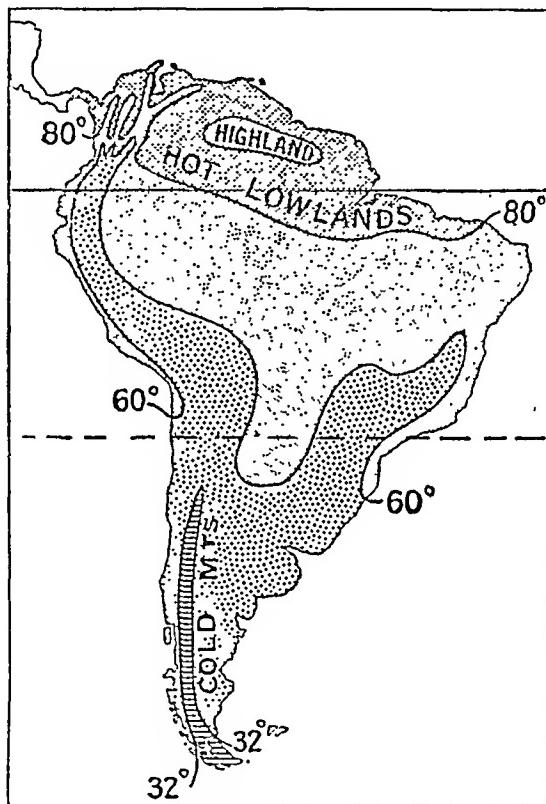


FIG. 346.—The temperate of South America in July (cold season).

sun is shining over the northern Tropic this strip comes under the influence of the Anti-Trades. It has then a Mediterranean climate—hot dry summers and warm moist winters. The town of Valparaiso is in this belt. Remember that the seasons are the opposite of those in the northern hemisphere and that December is midsummer.

Temperature—Conditions in January.—At this period of the year the sun is shining nearly over the Tropic of Capricorn. The hottest region is over the lowlands south of the Equator. Notice the very remarkable fact that the east coast is warmer than the west coast. If

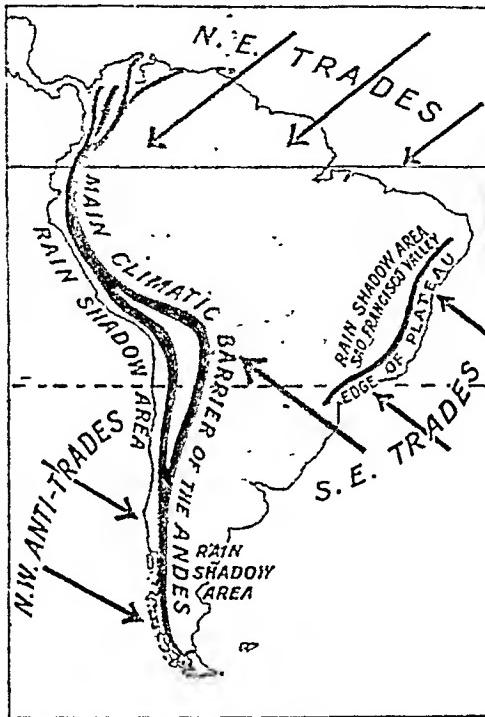


FIG. 347.—The mountain ranges and regular winds of South America.

Compare this map very carefully with the rainfall map.

you turn to Fig. 345 you will see that the west coast is influenced by the cold current coming up from Antarctic regions and forming the Peruvian current. This is a splendid example of the influence of a cold current on temperature.

**Temperature—Conditions in July.**—At this period of the year the sun is shining vertically over the northern Tropic. The hottest part of the continent is in the north, and the southern part of the continent is colder. Notice that the influence of the cold current on the west coast is

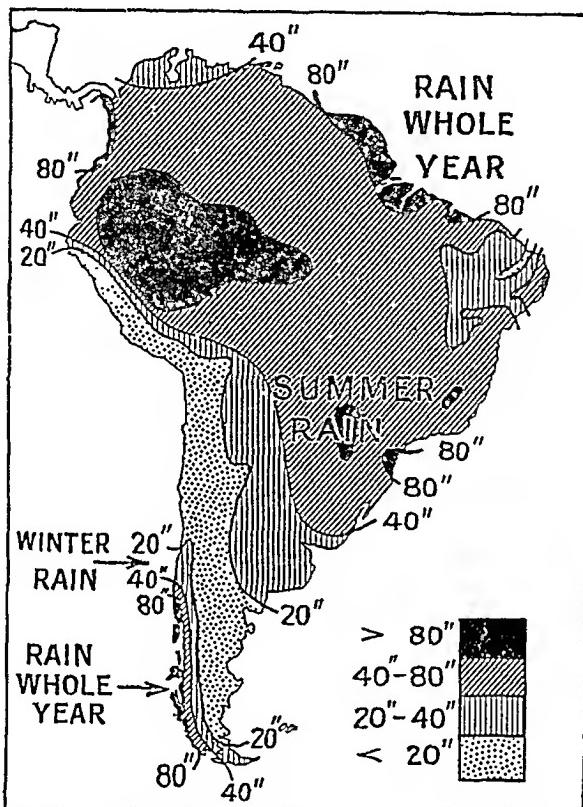


FIG. 348.—Rainfall map of South America for the whole year.

still seen, but not so markedly as in the summer. Compare the temperature of Para—nearly on the equator—in Fig. 346 and the last map. Notice it has a typically Equatorial climate—nearly  $80^{\circ}$  the whole year round. You will notice Quito is also on the Equator but is 9000 feet above sea-level, and so has a very pleasant cool climate all the year. Its temperature is roughly  $55^{\circ}$  for the whole year.

Winds and Rainfall.—Fig. 347 shows you how the regular winds are dried in crossing the great mountain ranges. The influence of this on rainfall is well seen in Fig. 318. The saying "rain follows the sun" is true of South America. When the sun is in the south there is a heavy rainfall over the greater part of the continent. The following points should be noticed on the map:

- (1) The heavy rainfall over the Amazon River (Equatorial belt of rain at all seasons).
- (2) The dry Pacific coastal strip.
- (3) Patagonia is dry, being on the lee of the Andes.

When the sun is to the north, over the Tropic of Cancer, the heaviest rainfall is in the north. The Amazon River is still in the heavy rain belt, and the Pacific coastal strip is still dry, but Valparaiso is now within the influence of the westerly winds and is receiving some rain (Mediterranean region). Patagonia is again dry, being still on the lee of the Andes.

You remember that in India there is a tendency for the rain-bearing winds to be drawn up the Ganges Valley. Similarly in South America the rain-bearing winds tend to be drawn up the Parana-Paraguay valleys and right up the Amazon Basin. In Eastern Brazil the rain-bearing Trade Winds are dried in crossing the edge of the plateau, and so the Sao Francisco Valley is very dry. Compare the Dry Belt of Burma. The coast enjoys a moderate rainfall, but the winds do not penetrate to the interior of the plateau, with the result that the surface of the latter is somewhat dry. In the north-west of the continent the rainfall is increased by a slight monsoon.

## 5. NATURAL VEGETATION

The natural vegetation of South America is very simple. The hot wet lowlands of the Amazon Basin and the coastal plain are covered with very dense Equatorial Forests,

The Amazon Basin is the largest area of Equatorial Forest in the world. The plateaux lying in the Tropics (Plateaux of Guiana and Brazil), as well as a large part of the Orinoco

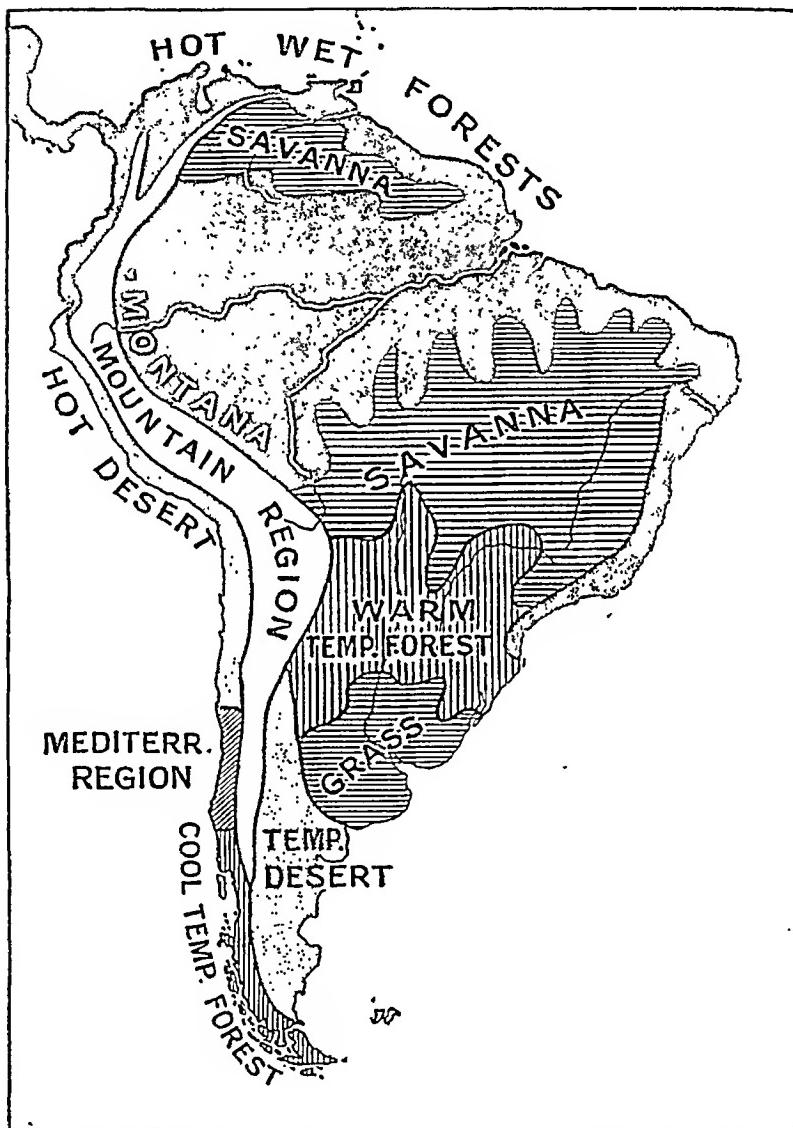


FIG. 349.—The natural vegetation of South America.

Basin, are occupied by Tropical Grasslands, or Savannas. The grasslands of the Orinoco have received the special name of Llanos. South of the Brazilian Highlands are warm Temperate Forests, passing into the Temperate Grasslands of the Argentine, which in turn become drier and pass into the Temperate Desert of Patagonia. On the west of the Andes a hot desert occupies the rain-shadow area in the Tropics. South of this is the small area of Mediterranean vegetation, which in turn passes into Cool Temperate Deciduous Forests. Follow all these points carefully in Fig. 349.

#### 6. NATURAL REGIONS

Combining what we have now learnt of the physical features, the climates, and vegetation, we are now in a position to divide South America into its major Natural Regions. We can take each of the main physical regions, and we shall see that we can divide each up according to climate. Fig. 350 gives a key to these regions.

(1) Natural Regions of the Pacific Coastal Strip.—

(a) Wet Region in the north, as far south as the equator.

(b) Desert Region of North Chile. Very little rain and of very little importance. Great areas of this dry region, however, yield large quantities of a salt known as nitrate, which is valued in the agricultural countries of Europe as a manure. This salt occurs as a crust over the surface of the desert. Were there any rainfall it would all dissolve and be washed away. Most of the towns in this dry region are either nitrate ports, or else serve as outlets to mountainous regions behind.

(c) The Mediterranean Region, a narrow strip around Valparaiso enjoying a Mediterranean climate and having the usual Mediterranean products.

(d) The Cool Temperate Strip, enjoying a moderate rainfall and covered with forests as yet little exploited.

(2) The Andes Chain.—(a) The Northern Andes,

consisting of several parallel chains separated by the fertile valleys of the Cauca and Magdalena.

(b) The broad Central Andes, chiefly noted for mining.

(c) The narrow Southern Andes, acting as a divide between east and west.

(3) The Central Plains.—(a) The Basin of the

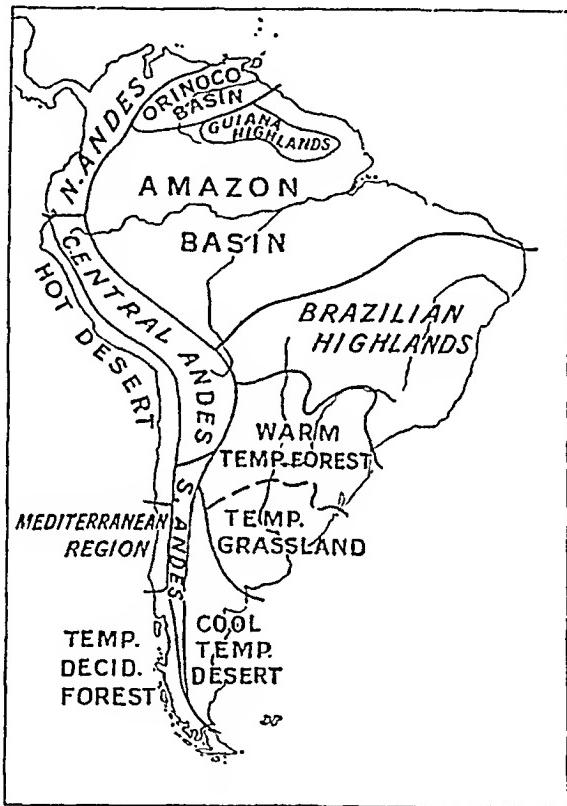


FIG. 350.—The major natural regions of South America.

Orinoco and lowlands fringing the coast, enjoying a tropical climate and where developed producing such characteristic tropical products as sugar and cocoa. The natural vegetation is mainly coarse grass and the grassland country is known as the Llanos.

(b) The Amazon Basin. Most of this immense basin

falls within the belt of equatorial rain at all seasons, and is clothed with dense Equatorial Forests (Selvas) of huge hard-wood trees. Like other regions of dense tropical forest, it is sparsely populated by backward tribes. It yielded the most important of the rubber-bearing trees, but most of the best trees growing wild have been found and killed by careless tapping, so that the great rubber-producing regions of the world are now the artificial plantations of Malaya and Ceylon.

(c) The Basin of the Paraná-Paraguay. Part of this region is forested, but in the lower part it is a land of rich luscious grass on which cattle thrive. To the south, in the Argentine, the grassland is drier and now forms one of the great wheatlands of the world.

(d) The Patagonian Desert. In the northern part this region supports a few sheep, but the greater part is a dry waste of shingle and sand.

(4) The Eastern Highlands.—(a) The Highlands of Guiana and Venezuela. This region has great mineral resources, but is little developed owing largely to an unhealthy climate.

(b) The Brazilian Highlands. This region of old crystalline rocks has vast mineral resources. The coastal portion has a rich soil and a tropical climate, ideal for coffee and other tropical products.

## 7. POPULATION

The original inhabitants of South America, when the continent was discovered by Europeans in the fourteenth and fifteenth centuries, were American Indians—some races, like the Incas on the plateaux of Peru, were highly civilised. Most of the Indians now remaining are very backward, uncivilised races found in such poorly developed and inhospitable tracts as the dark forests of the Amazon. The civilised nations now inhabiting South America are descended mainly from the Portuguese and Spanish explorers

who settled in the country, and Spanish is the usual language over most of the continent except Brazil, where Portuguese is spoken. The Spanish descendants are found on both sides of the Andes, but especially to the west, whilst the Portuguese are mainly on the east. In the northern countries many negroes were introduced for labour in the plantations, whilst of recent years large numbers of

European immigrants, especially Italians, have settled in the more temperate lands of the south. For long Brazil, the largest country of South America, was a colony of Portugal, but now, with the exception of the small colonies of British, French, and Dutch Guiana, and the British island of Trinidad, all the countries of South America are independent republics. Notice from the population map that nearly all the continent is poorly populated. There are three areas of heavy population: (a) around Valparaiso, which enjoys a productive Medi-

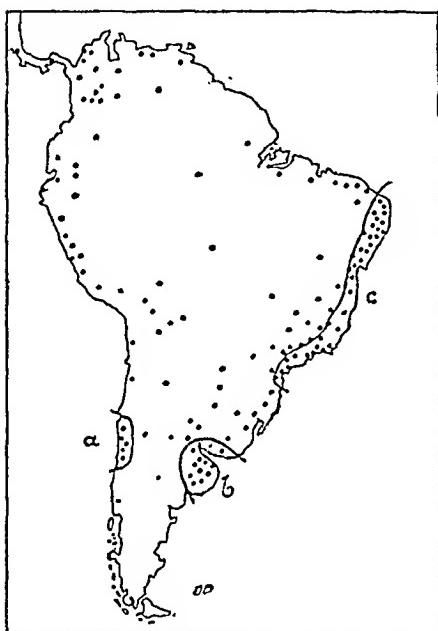


FIG. 351.—The population of South America.

Each dot represents 5 lakhs (500,000) of people. Notice *a*, *b*, and *c*, the three areas of concentration of the population and the reasons for the concentration.

terranean climate; (*b*) that part of the progressive state of Argentine around Buenos Ayres where the climate is ideal for wheat and cattle; (*c*) that part of the coastal lands of the Eastern Highlands where soil climate favours the growth of coffee, etc. Notice what a splendid example we have of the climatic control of the distribution of population.

## BRAZIL

Brazil is the largest country in South America and rivals in size the United States or Canada, and is nearly twice as large as the Indian Empire. It is, however, in a very backward condition. It comprises several natural regions:



FIG. 352.—Political map of South America.

The Great Basin of the Amazon, covered with some of the loftiest and densest evergreen tropical forests in the world. The great highway is the Amazon, which annually overflows its banks and becomes of enormous

width. It is navigable by ocean steamers right up to Manaos. This immense basin is almost uninhabited except by a few Indians. Para rubber is the only product of note, and that is gradually becoming less and less important in the world's supply, for the wild trees from which it is obtained have been largely killed by over-tapping and new trees are becoming harder and harder to find. Manaos is the collecting station for the rubber, and Para is the port at the mouth of the Amazon.

**The Brazilian Highlands.**—This is another immense undeveloped and almost unexplored region, which consists

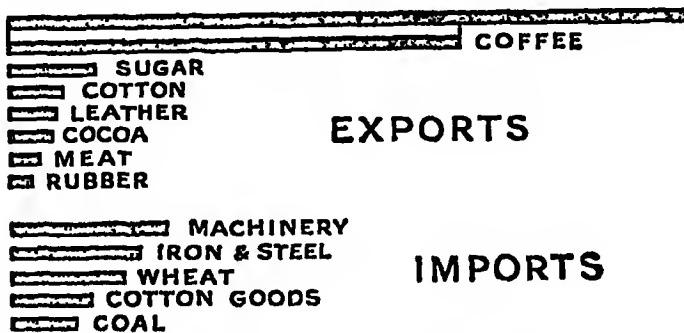


FIG. 353.—The trade of Brazil.

mainly of ancient rocks and will probably one day become one of the most important mineral-producing regions in the world.

The only developed part of Brazil is the strip along the Atlantic coast from the mouth of the Amazon to the region of Sao Paulo. This is really the coastal strip between the Brazilian Highlands and the sea. Its climate changes from equatorial in the north to tropical in the south, and the products vary accordingly. Cotton, sugar, rubber, and cocoa are the great products of the north, together with maize and the native foodstuff manioc. Around Sao Paulo the equatorial regions give place to a great coffee-producing country, with some cotton.

**The Parana-Paraguay Basin.**—The southern region of Brazil adjoins Uruguay and to some extent shares in the

great cattle-rearing industry of the latter state. The forested parts yield mate, or Paraguay tea.

**Railways.**—The main network of railways is around the fertile lands of São Paulo, connecting it with Rio de Janeiro (the capital and a port) and Santos (a port). This system also joins up with that of Uruguay. Farther north railways connect the coast towns of Bahia and Pernambuco with the valley of the São Francisco. The latter valley gives access to the great plateau, and is likely to increase in importance.

The civilised inhabitants of Brazil are largely of Portuguese descent and Portuguese is the official language.

### THE ARGENTINE REPUBLIC, OR ARGENTINA

The Argentine is the most progressive state of South America, largely because it has a large area of land with a



FIG. 354.—The temperate grass-  
land region of South America.



FIG. 355.—The great cattle lands  
of South America.

Notice that they are situated almost entirely in the wetter eastern parts of the temperate grasslands.

climate ideal for wheat and which has made the Argentine one of the great granaries of the world. Notice that the Argentine includes several natural regions:

(a) In the north it includes part of the Tropical Forests of the Upper Parana-Paraguay Basin. This area is little developed and is inhabited chiefly by Indians. A little mate is produced and bark for tannin.

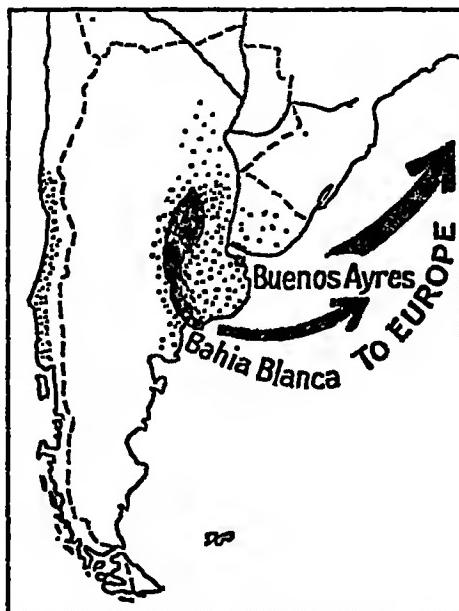


FIG. 356.—The wheatlands of the Argentine and South America.

Notice that they are situated in the drier parts of the temperate grasslands, west of the cattle regions.

(b) The grassland region is by far the most important region. It is moister and warmer to the north-east, and so maize and flax seed are there very important; the great wheatlands are around Buenos Ayres, to the south-east. Wheat cultivation is limited to the south by decreasing rainfall, but irrigation may partly extend the area under wheat. Fifty years ago, in the early days of the development of the Argentine, large numbers of cattle

and sheep were raised for the sake of tallow and hides, and a little salted meat was exported. When the process of freezing the meat so that it could be sent all the way to Europe in quite a fresh condition was introduced, the meat trade increased enormously and huge quantities of beef are now sent to Europe. Sheep are less important now than cattle because the grass is being improved and made suitable for cattle; moreover, wheat is using up much of the old sheep-farming lands. The grassland region centres on the La Plata River—the estuary of the Parana-Paraguay River—and a great network of railways join all parts of the wheat-lands with the main ports, Buenos Ayres (the largest city in South America), La Plata, Rosario, and Bahia Blanca. The harbours at these ports are not good and have to be kept up at great expense.

Naturally the main trade of the Argentine is with the busy industrial countries of Europe which require meat and wheat. The Argentine takes manufactured goods, coal, and oil in exchange.

The manufacturing industries of the Argentine are nearly all connected with its pastoral and agricultural regions, and include flour-milling, meat-freezing, dairying, etc.

(c) Between the main grassland region and the Andes is an area which enjoys a warm sheltered climate, almost Mediterranean in character. Wine-making can here be carried on, as well as fruit farming; whilst sugar, cotton, tobacco, and hemp can be produced. Tucuman (sugar) and Mendoza (wine) are the principal towns, and when the



FIG. 357.—The sheep lands of South America.

Notice that sheep are most abundant in the drier parts of the grasslands.

rivers from the Andes are used for irrigation, this region may become very important.

(d) Patagonia is mainly a great shingle desert of little value, but on the more grassy slopes of the Andes sheep may become important. In this region and the last oil-fields have recently been developed.

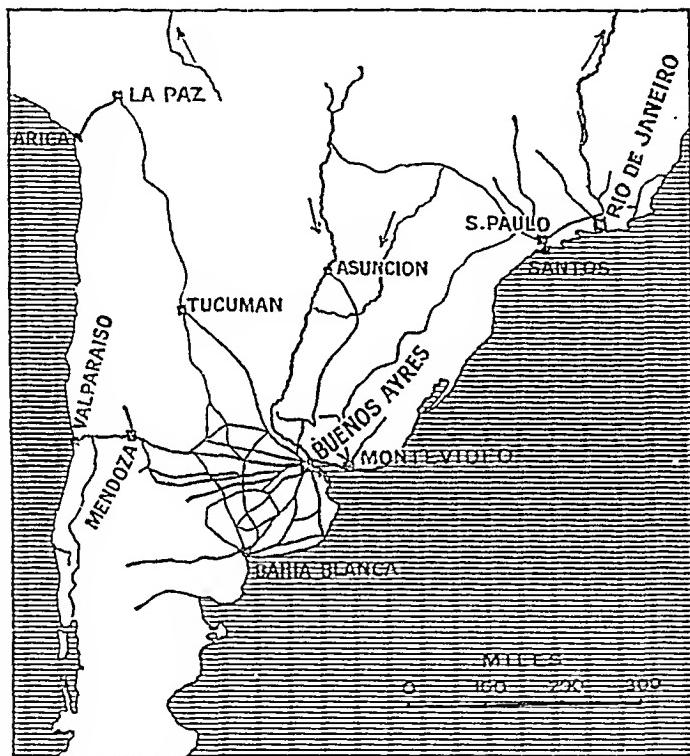


FIG. 358.—The railways of the Argentine.

Notice the great network in the temperate grasslands. The railways are of broad and metre gauge, very much mixed up. Navigable rivers are also shown, marked by arrows.

The Paraná and Paraguay are both navigable through Argentina, and require but little deepening to permit ocean steamers to ascend right into the forest-region—indeed to the state of Paraguay. As well as the network of railways in the grassland region and the line across the Andes into Chili, there are railways from the coast

to Tucuman and Mendoza. Unfortunately the Argentine railways suffer like those of India, from a mixture of gauges—broad (5 ft. 6 in.), standard (4 ft. 8½ in.), and metre (3 ft. 3½ in.).

The people of the Argentine are mainly of Spanish descent, but large numbers of Italians have migrated to the country in recent years.

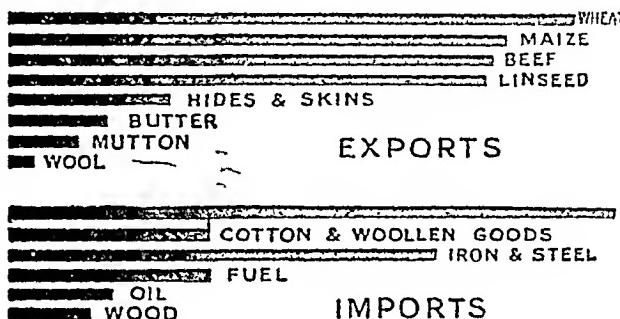


FIG. 359.—The trade of Argentina.

In this diagram a larger quantity of wool should be shown.

## PARAGUAY

Paraguay is a small republic, mainly between the Parana and Paraguay Rivers and in the same region of unhealthy tropical forest as the northern part of Argentina, but touching on the east the grasslands of the Brazilian Plateau. The grassland is by far the most important part of the country and is suitable for cattle. Maté, or Paraguay tea, from which a favourite South American drink is made, is produced.

Asuncion, on the Paraguay River, is the principal town, and can be reached from the sea. The inhabitants of Paraguay are mainly of mixed Spanish and Indian descent.

## URUGUAY

This little republic is on the opposite (eastern) side of the La Plata estuary to the rich grasslands of the Argentine. It is equally suitable for cattle rearing and the production of maize. Meat forms the staple export of the country. The chief town and port is Monte Video, from which there are railways to the centres of the meat-chilling industry.

## CHILE (or CHILI)

Chile is a long narrow state occupying the strip between the crest of the Andes and the Pacific Ocean. It is 2500 miles from north to south, but is nowhere more than 200 miles wide. Turn to Fig. 350 and notice that it comprises three natural regions, determined by climate :

(a) The Desert Region of the North (Atacama Desert), which is the great nitrate-producing region and which has other minerals such as copper and silver. The nitrate is exported through the port of Iquique. This port also serves the mineral-producing regions of Bolivia, and exports silver and copper. Arica is a similar port slightly to the north.

(b) The Mediterranean Region around *Valparaiso*—the largest port of Chile. This is the most productive and thickly populated part of Chile; its climate and products resemble those of Spain. The products include wheat and barley, wine and Mediterranean fruits. Sheep and cattle are also reared, the latter as the climate gets damper towards the south. Chile can thus be classed as an agricultural country, and the goods it requires are manufactured goods—cottons, woollens, and machinery. The exchange takes place mainly through the port of Valparaiso and, as we should expect, the trade is with such manu-

facturing countries as England, the United States, Germany, and France. Santiago, the capital, is an inland town in this region. Notice that this region produces the foods required by the mining districts to the north.

(c) The Forest Region of the South. Here the coast is deeply indented, intersected by fiords, and includes many islands. The region is almost uninhabited. In future years the forests may prove a source of much wealth. Sheep farming is carried on near the south of the region.

## BOLIVIA

Bolivia is a large but backward state. It consists of two regions:

(a) The western region, a great plateau (Plateau of Titicaca) of an elevation of 12,000 feet (compare Tibet) with an inland drainage into Lake Titicaca. This plateau is part of the Andes where they are broadest. It is rich in minerals, especially tin and silver, but only those born in the country can work at such a great height above sea-level. The minerals have to be exported through the ports of Mollendo in Peru, or Arica and Antofagasta in Chili.

(b) The eastern region, sloping down to the valleys of the Amazon Basin, has the tropical climate and natural resources of the Amazon Basin, except that the elevation for the most part is greater. The region is known as the Montana. Its natural outlet is through Brazil by river, or through the Argentine by railway.

La Paz, on the plateau, is the principal town of Bolivia.

## PERU

Like Bolivia, Peru consists of part of the Andean table-land and the Montana, as the forested land sloping down

to the Amazon is called. Peru, however, has the advantage of possessing a strip of the Pacific coastal plain.

Although it is a desert, the coastal strip is the most important region of Peru. Irrigation can be practised there, and the production of sugar and cotton is increasing. Lima, the capital, is in this belt, and Callao is the great

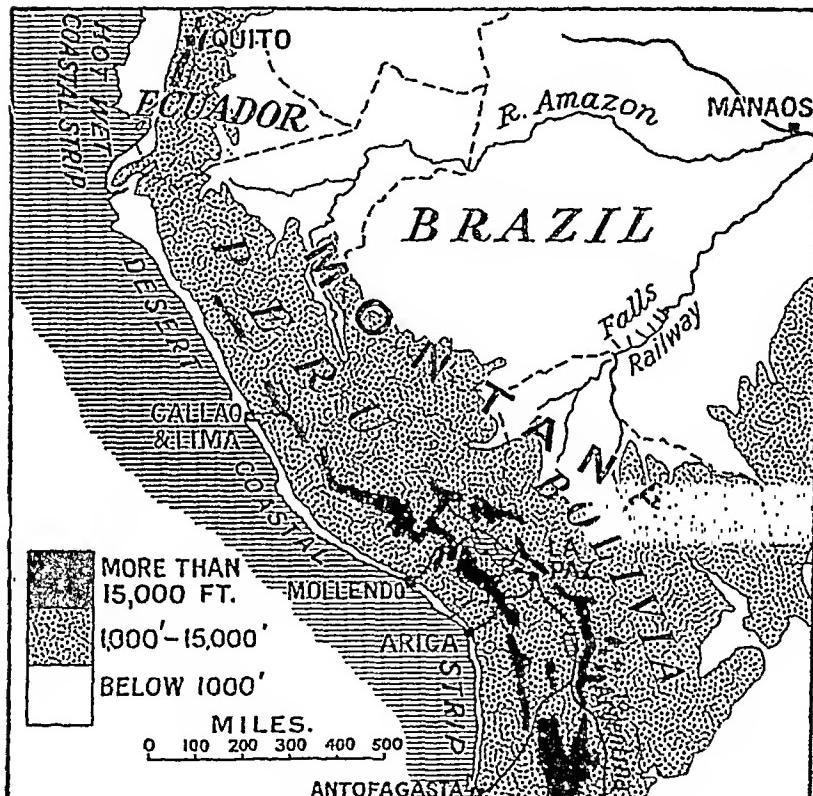


FIG. 360.—Map of Peru, Bolivia, and Ecuador.

port. *Mollendo*, to the south, is the port for Bolivia. As in Bolivia, the Andean Region is rich in minerals (copper and silver), and in this region the lama is valued as a transport animal and for its wool, whilst the alpaca yields valuable wool. The Montana Region is still undeveloped.

## ECUADOR

Ecuador falls within the same three natural regions as Peru, but here the coastal strip receives a good rainfall and the production of cocoa is important. Quito, the capital, is almost on the equator, but is at a height of 9000 feet above sea-level and has an average temperature of only  $55.5^{\circ}$ . Compare this with Darjeeling 7000 feet, average temperature  $52^{\circ}$ . Places on the sea-coast near the equator have an average temperature of about  $80^{\circ}$ , with very little range. Quito has an extraordinarily small range, less than  $1^{\circ}$ .

## COLOMBIA

Colombia is at the northern end of the main chain of the Andes, and there the mountains have split into four branches. The natural regions into which the country can be divided are as follows :

(a) The lowlands of the coast and the main valleys between the Andean chains. The most important valleys are those of the Magdalena and Cauca. The climate is equatorial, with the usual products such as cocoa, sugar, cotton, and bananas. Bogota, the capital, and main centre of population, is on the plateau near the Magdalena Valley.

(b) The mountain spurs. The slopes between 3000 and 7000 feet produce coffee and maize, and the former is exported to the United States ; higher up wheat and other grains are grown for home use, but lands above 10,000 feet are uninhabited.

The minerals of the mountain regions are probably valuable and important oilfields have recently been discovered near the coast. The Magdalena and Cauca are the great highways, and most of the export trade is through the ports of Cartagena and Barranquilla.

## VENEZUELA

Venezuela falls into four natural regions :

(a) The northern coastal lowlands, where the oilfields of the Maracaibo Basin are just becoming important. Cocoa and sugar are produced.

(b) The mountain spur from the Andes, with its production of coffee and maize.

(c) The llanos or grassy plains of the Orinoco Basin, devoted largely to cattle.

(d) The little developed Guiana highlands.

Caracas, the capital, is connected with its port, La Guayra, by railway, but there are no other towns of importance.

## GUIANA

Guiana consists of an undeveloped upland in the south, rich in minerals, and a tropical lowland in the north. It is divided into British, Dutch, and French Guiana, each colony centring around a small river basin. Gold and diamonds are the most important products of the highlands, whilst sugar, rice, and cocoa are produced in the lowlands. Georgetown, the capital of British Guiana, is near the mouth of the Essequibo.

## TRINIDAD

Trinidad is a small island near the mouth of the Orinoco River. It is a British possession and has very valuable oilfields and a deposit of pitch. The principal agricultural product is cocoa.

### QUESTIONS AND EXERCISES

1. Describe the Amazon Basin. What are the possibilities of commercial development in this region ?
2. What do you know of the nitrate industry of South America ?

3. Describe and account for the distribution of wheatlands in South America. What steps have been taken for further development of the wheatlands?
4. Write what you know of the livestock of the Americas and its distribution.
5. Write a description of the Parana-Paraguay Basin.
6. By means of a series of diagrams compare the climates of North America and South America.
7. What are the causes of the desert regions of South America? Of what use are they to mankind?
8. Compare and contrast the Mediterranean Region of Central Chili with that of California.
9. Write an account of the east coast of South America from the Amazon to Cape Horn, describing with maps the physical features, climate, and productions.
10. Write an account of the mineral wealth of South America. Draw diagrams to show the distribution of important minerals.
11. Write an account of the foreign trade of South America, stating the chief products exported, the countries from which they come, the countries to which they go, and the goods received in exchange.
12. Describe fully the Andean Chain.
13. If you had to go and live in South America in what country would you settle, and why?

## E. AFRICA

### 1. POSITION AND SIZE

AFRICA is the second largest continent, being next to Asia in size. Its area is 11,000,000 square miles, or six times the size of India. For its size Africa has a very short coast-line. It is three times as large as Europe,

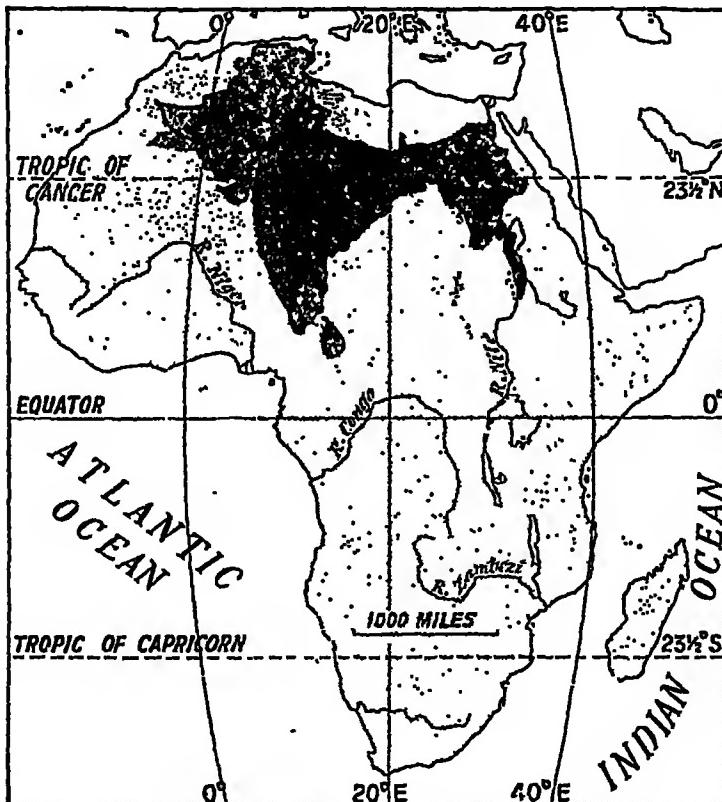


FIG. 361.—The position and size of Africa.

but its coast-line is only 19,000 miles long—shorter than that of Europe. Africa is the only continent which is almost cut in half by the equator. Rather more of Africa lies to the north of the equator than south of it, because the continent is broader in the north than in the south, but the north and south coasts are almost exactly equal distances from the equator. Notice the position of the Tropics of Cancer and Capricorn, and what a large part of Africa lies within the Tropics. Running from north to south through the continent and passing through its southernmost point is longitude 20° E. This is the same line as passes through the centre of Europe.

## 2. PHYSICAL FEATURES

In its physical features, Africa is a little like Australia in build, as it is a compact continent of the plateau type with bordering ranges on the west, east, and south. Except in the north-west, where we find the Atlas Series of Fold Mountains, belonging really to the European System, the whole of Africa is occupied by a great plateau. The great African Plateau is usually surrounded by a narrow coastal plain. Sometimes, as in South Africa, there are several "steps" up on to the plateau. The plateau is higher in the south than it is in the north. The High Plateau of South Africa stretches nearly as far north as the equator, and then sends broad branches northwards over the lower plateau there. Running along the eastern side of the surface of the plateau there are one or more lines of mountains. They start from the mountain knot of Abyssinia and run southwards through the Lake region of East Africa. These mountains are *not* fold mountains ; they are of volcanic origin, being built up by lavas which poured out on the surface of the plateau. In the south-east the edge of the plateau is very high and forms the Drakensberg escarpment.

Rivers.—The rivers of Africa have special features which make them different from the rivers of the other

continents. Most of them rise on the surface of the plateau, and have a long navigable course over the plateau until they reach its edge. There they drop down to the coastal plain by a series of rapids or falls. It follows that

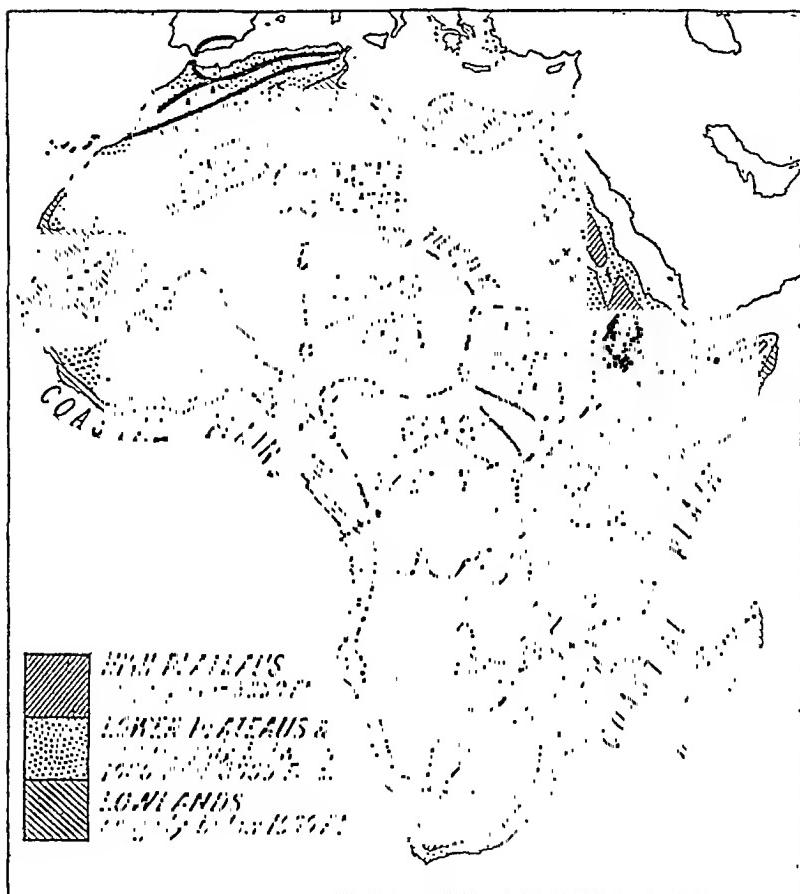


FIG. 362.—The main physical features of Africa.

very few of the rivers are navigable far inland from the coast, but their upper courses can be used. Some of the rivers, notably the Nile, descend from the plateaus by a series of steps. The most important rivers of Africa are the Nile, which flows northwards into the Mediterranean

Sea ; the Senegal, Niger, Congo, and Orange draining into the Atlantic Ocean ; and the Limpopo and Zambezi flowing into the Indian Ocean. The big basin of the River Congo, forming a depression in the African Plateau, should be noted.

An important feature of the plateau is the series of



[Plate : South African Railways Publicity Dept.]

FIG. 363.—The edge of the high plateau of South African Plateau (the edge is called the Drakensberg).

great lakes amongst the volcanic mountains of the east. The lakes occupy two main lines, probably rift valleys, with Lakes Albert, Edward, and Tanganyika along the western line, and Lakes Rudolf and Nyasa along the eastern line. Lake Victoria lies between the two lines. To the south of the Sahara lies Lake Chad, the centre of a region of inland drainage.

### 3. CLIMATE

Africa lies both to the north and to the south of the equator, and so we must be careful in talking about the

"Cold Season" or "Winter," and the "Hot Season" or "Summer." When the Hot Season is prevailing in North Africa it is the Cold Season in the south. When it is the Hot Season in the south it is the Cold Season in the north.

**Conditions from November to April.**—At this season the sun is shining vertically south of the equator.

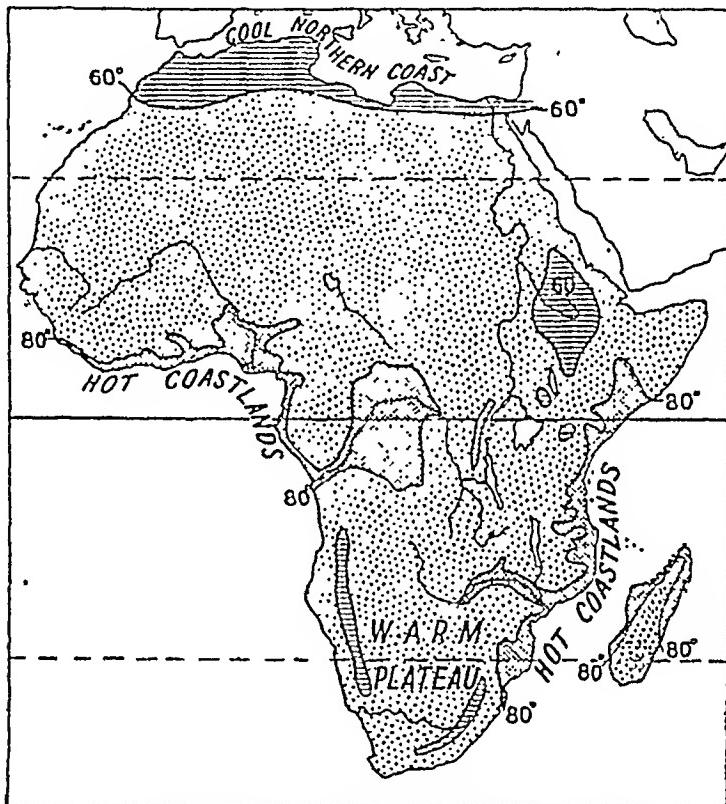


FIG. 304.—Climate: actual temperatures in January.

In January the sun is vertical over South Africa, but most of the plateau is over 4000 feet, and so fairly cool. The west coast is kept cool by the cold Benguella Current, and so the hottest part of Africa is the east coast. At this season it gets cooler northwards from the equator, and the coolest

part is the northern coast of Africa. The winds of Africa are very simple. We only need to take a physical map of Africa and mark on it the regular wind systems, remembering that in January they have swung to the south, and in June swing to the north. During the period November

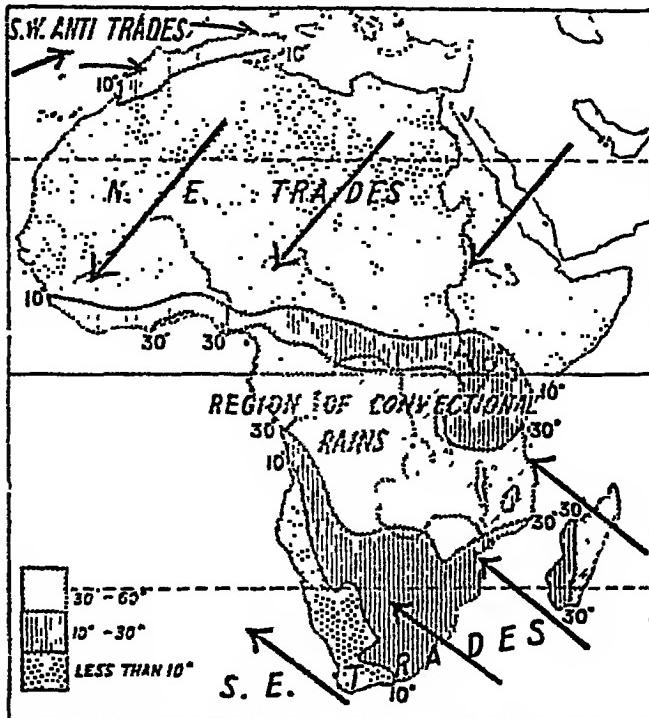


FIG. 365.—Climate: rainfall and winds, November to April.

to April the northern coast of Africa comes under the influence of the South-West Anti-Trades and enjoys a mild wet winter (Mediterranean Climate). The High Pressure Belt, from which the North-East Trade Winds start, runs across the north of Africa, and so these winds start from a land mass and are dry. They blow towards a warmer place, and so become more thirsty as they go. Along the

equator itself convectional rains fall, and south of the equator there is a good rainfall, brought by the South-East Trade Winds. The rainfall is heaviest on the east coast and gets less as we cross the continent, so that there is a dry rain-shadow area on the west. At this season of the

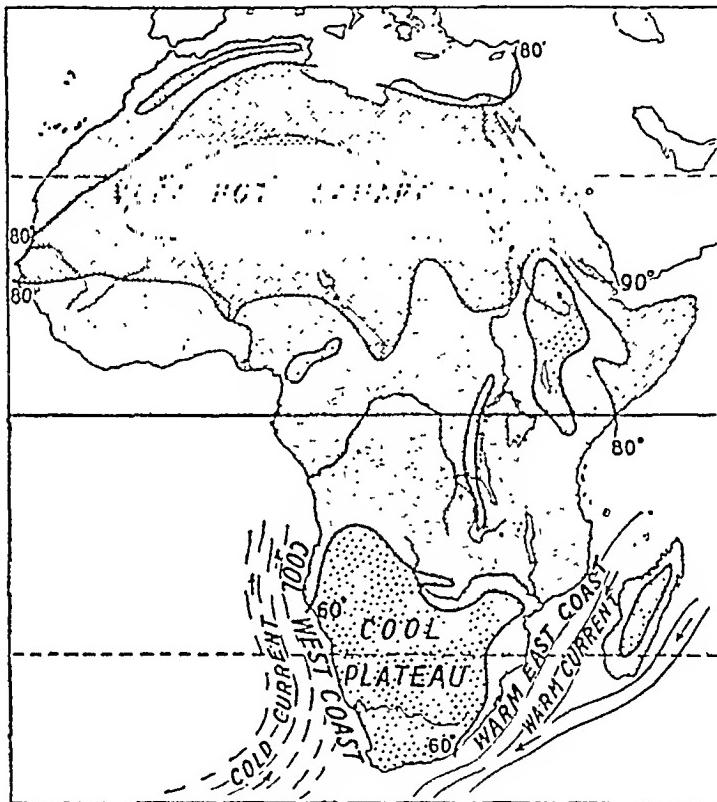


FIG. 366.—Climate: actual temperatures in July.

year the extreme south-west of Africa lies in the High Pressure Belt from which the Trade Winds start, and so is dry.

**Conditions from May to October.**—At this season the sun is shining vertically over the Tropic of Cancer, and the great land area covered by the Sahara Desert gets very hot indeed. At this season the temperature gets less as we go southwards from the Sahara. The whole

of North Africa is dry, for it lies under the Trade Wind belt. South of the equator the region of the South-East Trades has shifted northwards, and the extreme south-west receives the rainy North-West Anti-Trades. It is at this season, when the Sahara Desert gets very hot indeed,

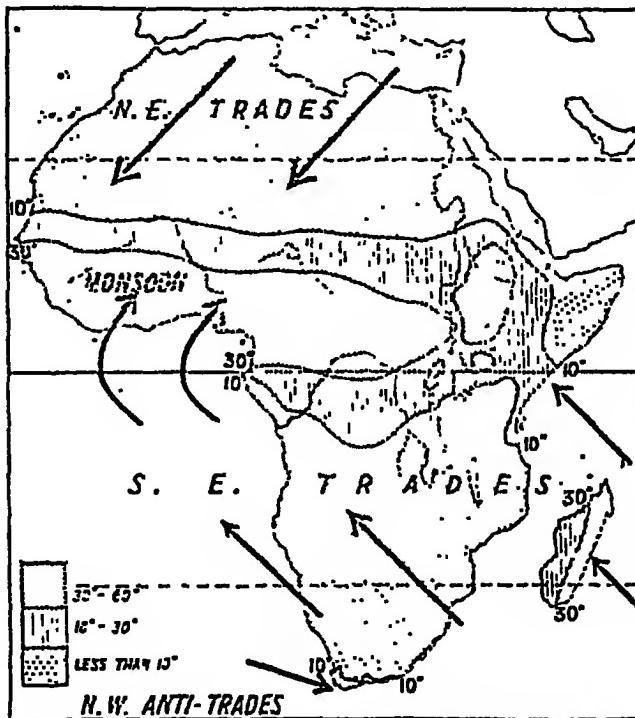


FIG. 367.—Climate: rainfall and winds, May to October.

that the hot air rises and cool winds are drawn in from the sea. These cool winds are really monsoon winds and form a continuation of the South-East Trade Winds. They bring a very heavy rainfall to the coast of Guinea.

**The Climates of Africa.**—The climates of Africa are arranged so that we find the same types to the north of the equator as there are to the south.

(a) Equatorial Climate, always hot and wet, is found along the equator, especially in the Basin of the Congo and along part of the coast of the Gulf of Guinea.

(b) Tropical Climate, with rain in the summer and dry in the cool season, is found both north and south of the equator. But in the north the "summer" is from May to October, whilst in the south it is from November to April. So characteristic of Africa is this climate that it is often called the "Sudan type."

(c) Desert Climate, dry at all seasons, is found along the High Pressure Belts in the north and in the south. In the north it stretches right across the continent, but in the south it is found only on the west of the continent. The east receives moisture from the Trade Winds blowing across the Indian Ocean. (Warm temperate climate (d).)

(e) Mediterranean Climate, with winter rain and summer drought, is found both along the north and along the south-west coasts. Again, "summer" in the north is from May to October, in the south from November to April.

(f) Temperate grassland climate occurs on the plateau in South Africa.

The whole of Africa is a plateau, and the plateau is especially high in the south. So we find the climates are often much cooler than they would be if the surface of Africa were lower.

#### 4. THE VEGETATION OF AFRICA

The vegetation belts of Africa correspond very closely with the climatic belts.

(a) Equatorial Forests of tall evergreen trees cover the Basin of the Congo and the Guinea Coast, where the rainfall is very heavy.

(b) Tropical Grassland and Savanas occupy a broad belt on either side of the Equatorial Forests. The most characteristic type of vegetation in Africa is the savana —known in the south as bush veld. As we approach the desert region the savana becomes poorer and poorer and

passes into scrubland. The Kalahari "desert" is really scrubland.

(c) Deserts cover enormous areas in North Africa (Sahara Desert) and a smaller area in South Africa (south-

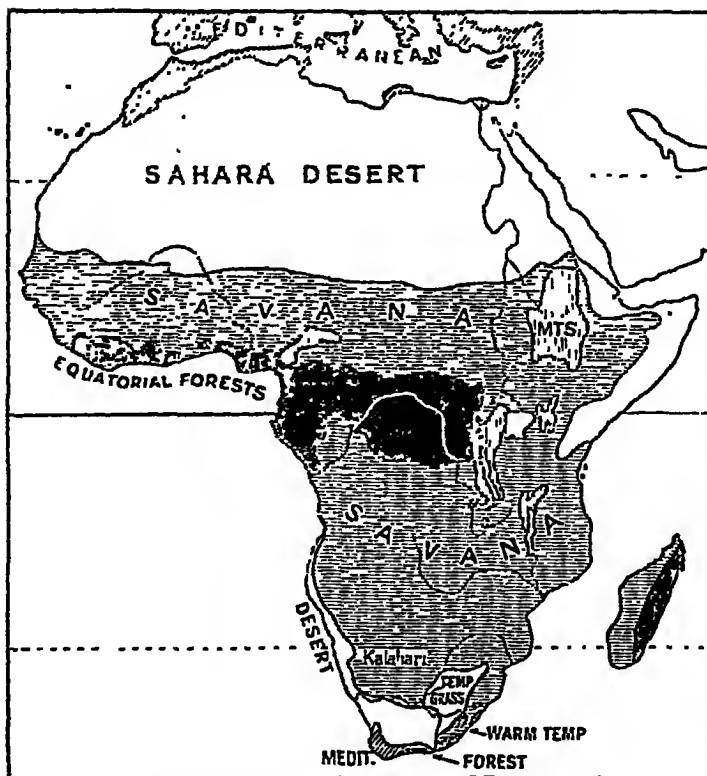


FIG. 368.—The natural vegetation of Africa.

west coast). Sometimes they are great sandy wastes, at other times bare, rocky mountain ridges break up the surface. There are many important oases in the Sahara; most important of all is the long narrow valley of the Lower Nile.

(d) Warm Temperate Forests occur in Natal in the south-east.

(e) Mediterranean Vegetation is found near and along the coasts of north Africa and south-western Africa.

(f) Temperate Grassland covers the south-eastern part of the African Plateau. The grassland is known as the veld. It is cool in winter and hot in summer, but it is not a great distance from the sea like the grasslands of Europe and Asia, and so does not suffer from the same extremes of temperature. (In South Africa nearly all the natural vegetation is called "veld" just as "jungle" is used in India. The temperate grassland is really the "High Veld" because it is found on the heights of the plateau.)

(g) Mountain Vegetation, with temperate forests and grasslands, covers most of the Abyssinian Highlands.

## 5. NATURAL REGIONS OF AFRICA

The major natural regions correspond with the vegetation regions. Make a list of them, noting the physical features, climate, and vegetation of each.

## 6. THE POPULATION OF AFRICA

In Asia we learnt that the Himalaya Mountains form a great barrier to the human race. Indians are found on one side and Mongolians on the other. In Africa we find that a great desert can also act as a barrier to mankind. North of the Sahara the people are Arabs and Egyptians, and are closely allied to the peoples of Southern Europe. But Africa, south of the Sahara Desert, is inhabited almost entirely by negroid peoples with black skins and woolly hair. In the part of Africa south of the Sahara we find small groups of very backward, uncivilised people. These few people have been forced to flee to the worst parts of the continent, and so we find them both in the heart of the equatorial forests of the Congo (here the Pygmies live), and

on the borders of the Kalahari Desert (here the Bushmen live). Africa is not very thickly populated, and so there is plenty of room for the white man, who has settled over a large part of South Africa—on the temperate grasslands of the plateau or in the Mediterranean region.

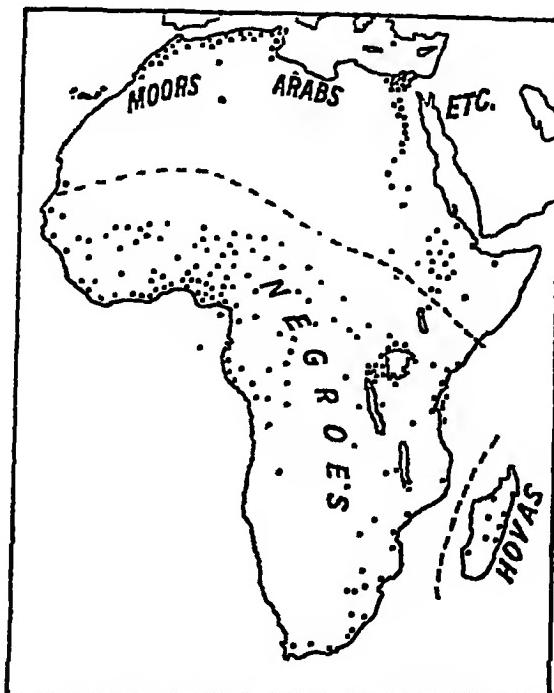


FIG. 300.—The population of Africa.

Each dot represents 500,000 people. This map is on the same scale as the population maps of the other continents.

#### 7. THE OPENING UP OF AFRICA

Until recently Africa was known as the "Dark Continent," for it was very little known to the world outside. There are no great bays or gulfs penetrating inland, the rivers are interrupted by rapids near their mouths, the

coastal belts are unhealthy, and the Sahara Desert forms a great barrier preventing exploration from the north. So the interior of Africa remained for long unknown to Europeans. The opening up of Africa commenced with the discoveries of great explorers such as Livingstone and Stanley. The Negroes were for the most part backward and lazy, as well as being frequently quarrelsome, and so nearly the whole of Africa has come under the rule of European nations. But many groups of Negro peoples are now making rapid progress.

### THE MEDITERRANEAN OR BARBARY STATES

That part of North Africa which enjoys a Mediterranean Climate is divided between three states, Morocco, Algeria, and Tunis. Running through the three countries are the mountain chains of the Atlas. Fig. 370 shows roughly the arrangement of the main ranges. Notice that the states fall into three parts :

- (a) The coastal strips.
- (b) The plateau between the main chains of the Atlas.
- (c) The Saharan plateau.

The rain-bearing winds of the cold season come from the west, and so Morocco, on the west, enjoys the best rainfall.

#### MOROCCO

is an old Mahomedan Empire, now under the protection of France. In the north, Ceuta belongs to Spain, and there is a strip of land under Spanish rule. But the main port of Tangier is international.

The Coastal Plains are fertile ; barley, wheat, and maize are widely grown. Huge numbers of Mediterranean fruit trees also exist—olives, vines, figs, oranges, etc. Numerous cattle are reared. Nearly one-half of the people of Morocco live in this fertile plain. Cassablanca is the chief town and port, and Fez is an important trading centre. Behind the coastal plain, but before one reaches the Atlas



FIG. 370.—The Mediterranean or Barbary States of Africa.

mountains, is a low plateau called the Meseta. Except near the hills, where there is water for irrigation, it is too dry for crops. But there are large numbers of sheep and cattle. On the Meseta is Marrakesh (or Morocco), an important market.

**The Atlas Mountains and Enclosed Plateaux.**—The mountains are often covered with forests of cork-oak, cedar, etc. The plateaux are of little use.

**The Sahara** has a number of oases with date-palms.

Morocco is a backward country, but is likely to advance under French influence, and it is believed to be rich in minerals. The exports (eggs, wheat, barley) are only worth about one-third of the exports of the Province of Burma.

#### ALGERIA

is a French Colony and has developed rapidly under French influence.

**The Coastal Strip**, lying between the crest of the mountains and the sea, is known as the Tell. It is the most important part of the country. The valley and plains have good soil, but usually require to be irrigated. Large quantities of wheat and barley are grown, as well as the vine and various fruits. The progressive farms are mainly owned by Europeans. The hills are covered with forest or scrub forest, the most important trees being cork-oak, pine, and cedar. The higher parts of the hills are suitable for sheep. After wine, sheep form the chief export of Algeria. Along the coast sardine fisheries are important. The principal towns and ports are Algiers and Oran.

**The Plateau** between the Tell and the Saharan Atlas is known as the Plateau of the Shotts; a shott being a shallow lake which dries up in the hot season. The plateau is covered with poor grass on which feed many sheep and goats. The inhabitants are nomads, and move about with their flocks in search of good grass. The alfa grass is used for paper making.

**The Sahara** has several oases, and the French have sunk artesian wells and made it possible to extend the

fertile area. The great product is the date, obtained from the date-palm.

Iron ore and phosphate are mined in Algeria, and other minerals in smaller quantity. The French have built a number of railways in Algeria and developed the country, so that its export trade (wine, sheep, wheat, tobacco, and minerals) is seven or eight times as much as that of Morocco. The trade is mainly with France.

#### TUNIS

is also a French Protectorate. It forms a continuation eastwards of Algeria and may be divided into the same regions, but the Plateau of the Shotts is much narrower. The principal town is Tunis, near which are the ruins of Carthage. Carthage was a powerful city in the days of the Roman Empire, 2000 years ago.

### THE BASIN OF THE NILE (Egypt and the Sudan)

#### THE RIVER NILE

is one of the world's greatest rivers. The main river, which flows through Egypt, is formed by the union of two main branches, the White Nile and the Blue Nile. The White Nile rises in the Lake Victoria on the high plateau of East Africa. Lake Victoria is right on the equator, and so receives a good rainfall nearly all the year round. Flowing northwards the Nile drops by a series of rapids and waterfalls till it reaches the flat plain known as the Bahr-el-Ghazal. For nearly a thousand miles through this plain, from Rejaf to Khartoum, the White Nile is navigable. The plain is so flat that large areas are covered with marsh and the Nile is joined by many streams, of which the largest is the Bahr-el-Ghazal. This plain lies in the Tropical Climate or Savana Region, with rain in the summer. The Blue Nile rises in a small lake in the midst



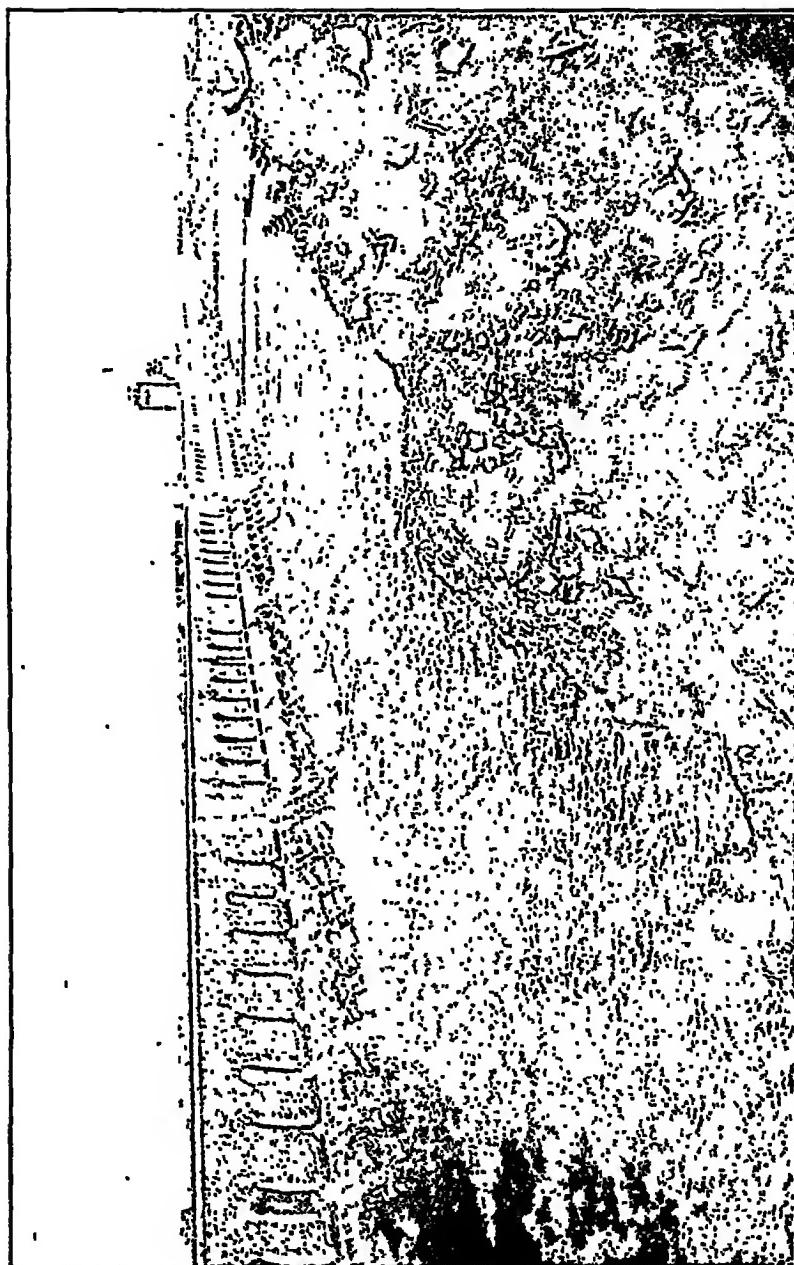
FIG. 371.—The Nile Basin.

In Egypt each dot represents 50,000 acres of cultivated land. Notice the small area when compared with the size of Ceylon. Notice carefully the position of Sennar.

of the Abyssinian Mountains. In summer the snows on the high mountains melt and heavy rain falls, so that the Blue Nile comes down in flood at the end of the summer, in August or September. Notice that the White Nile is a constant stream; the Blue Nile has a flood season and a low-water season. The two rivers join at Khartoum and enter the Desert Belt. Below Khartoum the Nile commences a gentle descent to sea-level. For more than 800 miles the Nile is interrupted by a series of six rapids known as cataracts, and so cannot be used by steamers. Near Halfa is the second cataract, and the Nile enters Egypt; at Aswan is the lowest or first cataract, and the Nile enters its famous valley through Egypt. Note that from Khartoum right to the sea the Nile flows through the Desert Region. Just as Sind would be a desert waste if it were not for the Indus, so Egypt would be nothing but a desert if it were not for the Nile. Remember, then, that the White Nile rises on the African Plateau in Uganda, but for the greater part of its course flows through the Sudan; the Blue Nile rises in Abyssinia, but flows for 300 miles through the Sudan. Remember that only about one-fourth of the course of the Nile is in Egypt.

#### THE SUDAN (Anglo-Egyptian Sudan)

is part of the British Empire, and is one of the great countries of the future. Its development has only recently commenced. South of Khartoum both the White and Blue Niles flow through fertile alluvial land with a climate suited to cotton and many other crops. The rainfall is small, but water from the rivers is available for irrigation. The Sudan has an area of more than 1,000,000 square miles—well over half the size of the whole of India and Burma, but at present has only 6,000,000 people—fewer than in the State of Mysore. At the end of 1925 the great Sennar Dam across the Blue Nile was completed, and a large area of land south of Khartoum is now irrigated and being planted with cotton. The principal



[Photo : The Sudan Government.]

FIG. 372.—The Sonnar Dam, Anglo-Egyptian Sudan.  
This dam has been constructed across the Blue Nile and is enabling huge areas of cotton-growing lands to be irrigated.

town of the Sudan is Khartoum, at the junetion of the White Nile and the Blue Nile. It is connected with Port Sudan, on the Red Sea, by a railway. The Sudan exports cotton, gum arabic (obtained from a small tree growing on the savanna), and millet. In 1924 the value of the raw cotton exported from Port Sudan was only one-fiftieth of that of India, but in the future it is likely that the Sudan will export more cotton than India.

### EGYPT

is an independent kingdom. Most of Egypt is a desert, and is as large as the whole of Peninsular India. Running through the centre of the country, from south to north, is the Nile. The Nile Valley is a flat-bottomed valley, about 10 miles wide and bounded by cliffs on either side. The only really useful part of Egypt is the Valley and Delta of the Nile—the total area of the useful land is only 12,000 square miles, or half the size of the island of Ceylon. India is a country crowded with people, and Bengal is the most densely populated of all the provinces. It has 600 people to the square mile. But the Nile Valley in Egypt has over 1000 people to the square mile.

Fertile Egypt falls into two parts :

- (a) The Nile Valley, or Upper Egypt.
- (b) The Nile Delta, or Lower Egypt.

**Upper Egypt.**—In the old days Upper Egypt used to be made fertile by the annual floods of the Nile, which spread a layer of fine silt as well as water over the land. The valley was divided up into a number of compartments rather like paddy-fields with high banks. This prevented the water flowing quickly, and was called basin irrigation. Now the valley is irrigated by canals from the great dam at Aswan.

**Lower Egypt** is also watered by canals. It is on the borders of the Mediterranean and gets a little rain in winter.

The principal crop of Egypt is cotton, and Egyptian

cotton is a very fine variety. The great food crops are maize, wheat, barley, and beans. A little sugar-cane and rice are grown.

Cairo is the capital and largest town in Egypt. It is situated at the head of the delta, on the borders of Upper and Lower Egypt, and so was a convenient centre from which to govern the whole of the long, narrow country. Egypt has a long and wonderful history ; it was a great

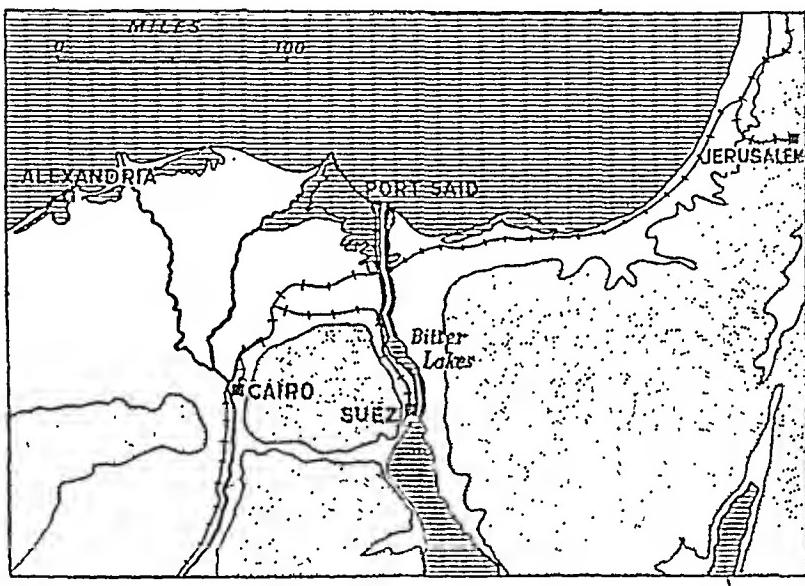


FIG. 373.—The Suez Canal.

Notice that there is no high land near and so there are no locks on the canal. The highest land passed through is only 50 feet above sea-level.

country 5000 years ago. Every year Egypt is visited by large numbers of tourists who come to see its old ruins, especially the Pyramids.

*Alexandria* is the principal port ; it is not a very good port, and suffers from mud filling up the channels. Raw cotton forms nearly nine-tenths of the exports of Egypt ; cotton seeds are also exported.

Egypt cannot grow enough food for her big population, and imports foodstuffs as well as coal, wood, cotton goods,

and iron and steel manufactures. India sends Egypt rice. Although cotton is almost the only export of Egypt, the value of cotton exported is less than that exported by India. Notice from the map the communications of Egypt, especially the way in which the railways have been built where the river cannot be used.

The Suez Canal lies in Egyptian territory. It cuts through a flat strip of desert, the isthmus between Egypt and Sinai. The canal is roughly 100 miles long, but part of that distance is through the Bitter Lakes. At the northern end is Port Said, on the Mediterranean ; at the southern end is Suez, on the Gulf of Suez. The canal was built by a French engineer named De Lesseps, and finished in 1869. That is a long while ago, when ships were not as large as they are now. So the largest ships cannot pass through the canal, and the steamers which travel between India and Europe are not as large as those which cross the Atlantic. The land is so flat on either side that there are no locks. Remember that the Suez Canal is not British ; it is owned by the Suez Canal Company, in which the British Government has some shares, other shares being held by the French. Nearly 5000 steamers pass through the canal in a year ; more than half of them are British.

## ABYSSINIA

Abyssinia is a wild and undeveloped country, consisting mainly of a mass of mountains. The people are very backward, and as yet there are practically no schools. The capital, Addis Ababa, is connected with the French port of Jibuti by the only railway in the country. India sends some cotton cloths to Abyssinia.

## THE HORN OF AFRICA

Turn again to Fig. 368, and notice that the great desert of Northern Africa stretches round the mountain

mass of Abyssinia and occupies the eastern projection of Africa. Along the shores of the Red Sea is the Italian colony of *Eritrea*. In future years the parts of Eritrea which lie nearest the Sudan may become important, and the port of Massawa may have more trade. The Horn of Africa is divided between French, British, and Italian Somaliland. It is mostly waste or scrub land inhabited by nomads with herds of camels, sheep, and cattle. Jibuti, the port of French Somaliland, has already been mentioned.

## EAST AFRICA

That part of Africa which is usually called East Africa consists of two parts :

(a) A portion of the great high plateau of Africa, the region round the great lakes.

(b) The coastal lands between the plateau and the sea.

East Africa is divided between the British Colonies or Protectorates of Uganda, Kenya, Tanganyika and Nyasaland, and the Portuguese Colony of Portuguese East Africa. Look carefully at Fig. 374, and notice that Uganda, Nyasaland, and most of Tanganyika lie on the plateau ; Kenya is half on the plateau and half on the coastlands ; Portuguese East Africa is entirely on the lowlands of the coast.

The Coastal Lands.—These lands lie entirely in the tropics and are therefore hot. They may be divided into two parts :

(a) The coastal plain, hot wet, often unhealthy and fringed with mangrove swamps and other forests. Coconuts grow along the coast and copra is exported. This region is also suitable for rubber and sugar-cane. The island of Zanzibar is famous for spices. Rice is the principal food grain. Along the coast are several ports which serve as the gateways into the interior. There is Mombasa in Kenya, Dar-es-Salaam in Tanganyika, and Beira in



FIG. 374.—Map of East Africa.

Portuguese East Africa. The extreme south of Portuguese East Africa lies outside the Tropics, and the port of Lourenço Marques is the main outlet for the British territory of the Transvaal.

(b) A hilly region (between the coastal plain and the plateau), which is drier, has a poor soil and is of little use.

**The Plateau.**—Owing to its great height above sea-level—usually from 3000 to 4000 feet—the plateau has a cool and pleasant climate suitable for Europeans. Many parts have a rich volcanic soil and a moderate rainfall. The chief food crop is maize, but the principal crop grown for export is cotton. Large quantities are exported from Uganda, Kenya, and Tanganyika. Coffee and sisal hemp (a strong fibre for rope making) are also important. The plateau is also very suitable for cattle.

Uganda, Kenya, and Tanganyika are developing rapidly and likely to become important countries in the near future, especially as producers of cotton. Portuguese East Africa is slow in developing. Except the ports, there are few towns of any size yet. The important one is Nairobi, in Kenya.

Zanzibar, on the island of Zanzibar, is a great trading centre, as well as an old port. Notice carefully the railways into the interior. On the plateau the lakes form the chief means of communication.

Fig. 375 shows the trade of the different countries.

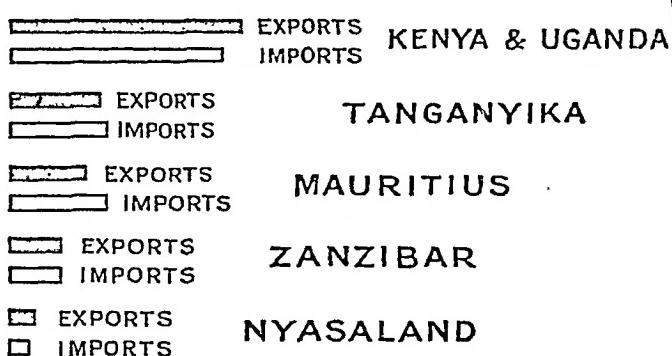


FIG. 375.—The trade of East Africa.

The total trade of all the countries shown is at present less than that of Burma or S.Ind. This diagram is drawn on the same scale as the ones for India, F.M.S., Straits Settlements, China, etc.

## SOUTH AFRICA

The greater part of South Africa is occupied by the British Dominion called the Union of South Africa. The Union of South Africa consists of four provinces which joined together in 1910. The provinces are the Cape of Good Hope, Natal, the Orange Free State, and the Transvaal. Since the Great War the Union also rules South-West Africa, which used to belong to Germany. Lying in South Africa are also the native states of Basutoland, Swaziland, and Bechuanaland, under British protection.

Lying to the north of the Union, and quite separate in government, are the British Colonies of Northern Rhodesia and Southern Rhodesia.

## THE UNION OF SOUTH AFRICA

**Physical Features.**—Before studying the geography of South Africa, go back and see what was said about the physical features of Africa. South Africa consists of two main divisions :

(1) *The Plateau*, nearly all of which is more than 3000 feet above sea-level. The south-eastern edge is the highest and nearly everywhere is 6000 feet high. Just as the Western Ghats form the high edge of the Deccan Plateau and are not really a separate range of mountains, so the mountains of South Africa are really the edge of the plateau. The edge has been given different names in different parts. The highest parts are known as the Stormberg and Drakensberg Mountains. The plateau slopes from east to west, and so the rivers flow from east to west. Most of the Plateau of South Africa is drained by the Orange River and its great tributary the Vaal.

(2) *The Coastal Strip*, occupying a broad area between the edge of the high plateau and the sea. The high plateau does not drop directly to a coastal plain, but the

land descends by a series of steps and the coastal plain is often quite narrow. Thus the coastal strip falls into two parts :

- (a) The Coastal Plain.
- (b) The steps up to the plateau, called the Karroo in Cape Colony and the Midlands or Highlands in Natal.

Compare this with the coastal strip, or Carnatic Region, which lies between the edge of the Deccan Plateau and the sea in Southern India.



[Photo : L. D. Stamp.]

FIG. 376.—The Cape of Good Hope.

**Climate.**—The south-west is under the influence of the rain-bearing westerly winds only in winter, and so this region has a Mediterranean Climate. The remainder of South Africa is in the South-East Trade Wind Belt, with the result that summer is the rainy season, and the heaviest rainfall is in the south-east and on the edge of the plateau. The surface of the plateau is in the rain-shadow of the Stormberg and Drakensberg Mountains. Compare this with the Deccan, which lies in the rain-shadow of the Western Ghats.

**Natural Regions.**—Considering physical features and climate together, South Africa falls into six large natural regions :

- (1) South-West Coast, or Mediterranean Region.
- (2) Karroo Region.
- (3) East Coast and Highlands, or Sub-Tropical Region.
- (4) Temperate Grasslands of the High Plateau (eastern part), or High Veld.
- (5-6) Scrubland or Desert of the High Plateau (western part) and the very dry West Coast.

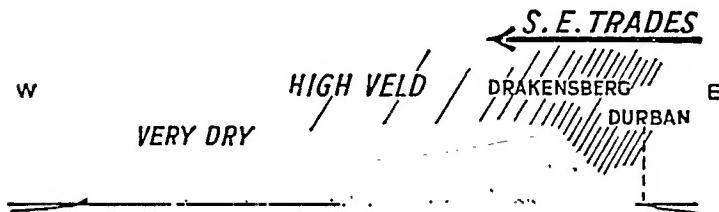


FIG. 377.—Section across South Africa.

The Mediterranean Region occupies the coastlands around the great port of Cape Town. Wheat and barley are largely grown, and so are Mediterranean fruits—grapes, peaches, and oranges. There are wine-making, fruit-tinning, and jam-making industries. The coastal region is broadest in the south-west ; to the east it gets narrow. It is not exactly a coastal plain but is broken up into rugged hills and fertile valleys. Cape Town has a fine harbour, the natural shelter afforded by Table Bay having been improved by the construction of an artificial harbour. It is a port of call for all steamers going round the Cape to India or Australia. At the extreme east of the region is the town of Port Elizabeth, which has also a considerable summer rainfall.

It was this part of South Africa which was first settled by Europeans, and there are very few Negroes living there.

**The Karroo.**—Between the Mediterranean coastlands and the high plateau there are two main steps—the Little Karroo and the Great Karroo. The rainfall is low, and

the extremes of temperature greater than near the coast. The vegetation is a poor scrub, and the main industry is

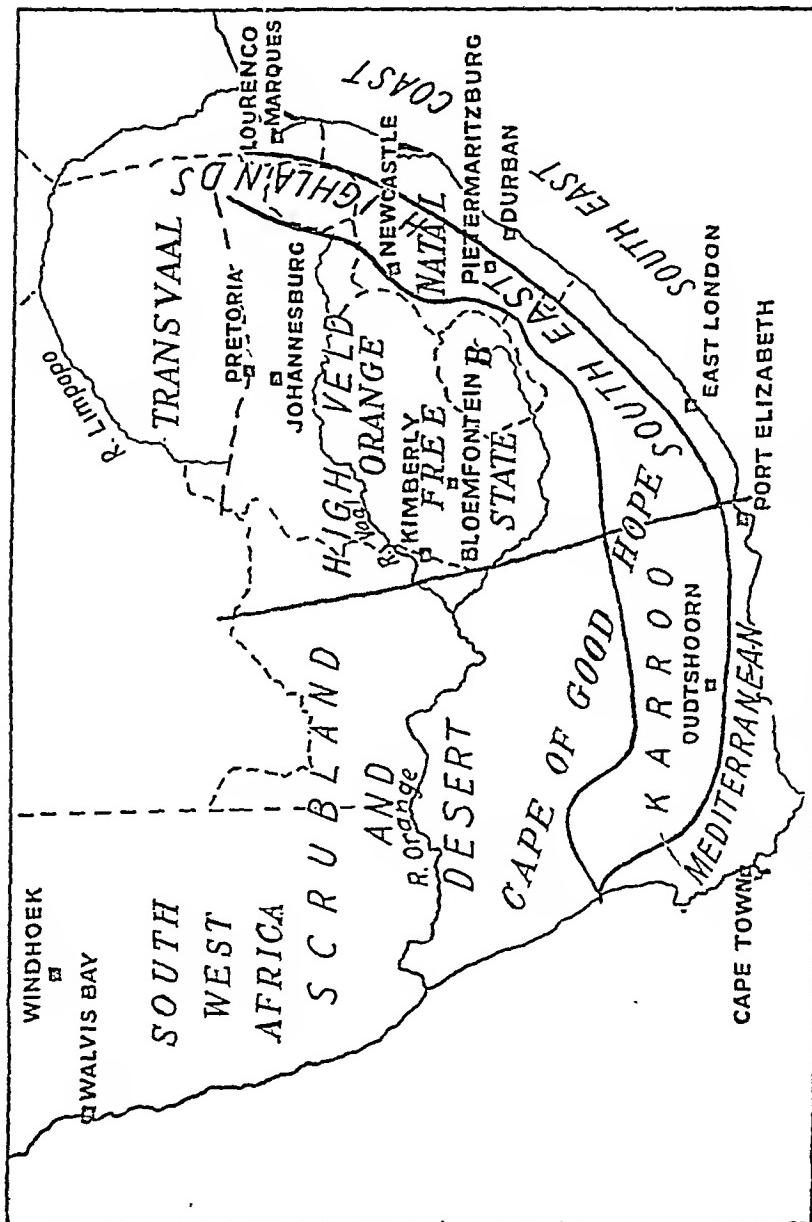


FIG. 378.—The Union of South Africa : natural regions and political divisions.

sheep farming. But the vegetation is often so poor that four to ten acres have to be given to each sheep. Around Oudtshoorn, on the Little Karroo, ostriches were formerly reared for the sake of their feathers.

The South-East Coast receives its rain from the Trade Winds, mainly in the summer months. Remember that South Africa is in the Southern Hemisphere, and so the summer months are November to February. This region is thickly populated by African natives (Negroes), whose principal food is maize and kaffir corn. The natural vegetation is a sub-tropical or warm temperate forest. In the warmer regions much sugar-cane is grown, as well as tobacco, but nearly all other crops grown are required to feed the large native population. The climate and products of this region are rather like those of the damper parts of India, and large numbers of Indians have settled here. The two great centres are the ports of East London and Durban. Round these ports there are large numbers of Europeans.

**The South-East Highlands.**—Between the south-eastern coastal plain and the edge of the high plateau there is a hilly region which occupies the greater part of Natal. Considerable areas are forested, and timber is worked for use in the treeless grasslands. The rainfall is good and there is a large native population, living mainly on maize. Large numbers of cattle and sheep are reared. Good coal is mined near Newcastle and exported from Durban. India buys large quantities of this coal, which is sent direct from Durban to Bombay. The principal town of this region is Pietermaritzberg. The native state of Swaziland lies in this region.

The Veld, or more correctly the High Veld, occupies the eastern half of the plateau of South Africa, including the eastern part of Cape Colony, the whole of the Orange Free State and most of the Transvaal. The climate gradually gets drier from east to west, and the grassland fades gradually into desert. By far the most important industry is sheep rearing, the sheep being kept for the sake



[Photo : South African Railways Publicity Dept.

Fig. 379.—General view of the Crown Mines, Johannesburg.

One of the largest gold mines in the world. Notice the huge pile of waste sand from which the gold has been extracted. The very fine gold is separated from the ore in the round tanks shown in front.

of their wool. The Veld exports the wool to be manufactured into woollen goods in England. The principal food grain is maize, and large quantities of maize are exported. Naturally maize is grown in the damper parts, where cattle are also reared. Parts of the Veld are very rich in minerals. Enormous quantities of gold are obtained in the Witwatersrand, near Johannesburg. This district alone produces half the world's annual supply of gold. There are extensive coalfields near Johannesburg; some of the coal is sent to India through the port of Lourenço Marques. The great diamond mines of Kimberley are on the western borders of the Veld, where it begins to pass into the desert. Diamonds are also found near Pretoria and elsewhere. In the north of the Transvaal the Veld begins to slope gradually northwards towards the Limpopo River. The *banken* or slopes are hotter than the high plateau, and round Pretoria much maize, fruit, cotton, and tobacco are grown. Instead of grass, scrubland is found. The land near the Limpopo is unhealthy.

*Johannesburg* and *Pretoria* are the principal towns of the Transvaal, and centres both of the mining and agricultural districts. *Bloemfontein* is the principal town of Orange Free State. Notice that the natural outlet of the Transvaal is through Portuguese East Africa to the port of Lourenço Marques, or to the Natal port of Durban. The Orange Free State is served by the ports of East London, Durban, Port Elizabeth, and Cape Town.

The Desert and Semi-Desert Region is sparsely populated. It covers not only the western half of the plateau of South Africa, but extends also to the west coast. Where there is a little grass sheep can be kept, and the natives of Bechuanaland wander about with their herd of cattle, sheep, and goats. In good years maize and kaffir corn can be grown. It is believed that the climate of South Africa is getting drier, and that this region used to be much richer than it is now. On the surface of the plateau are many "salt pans"—shallow salt lakes often dry for a great part of the year. The principal port on the west coast is

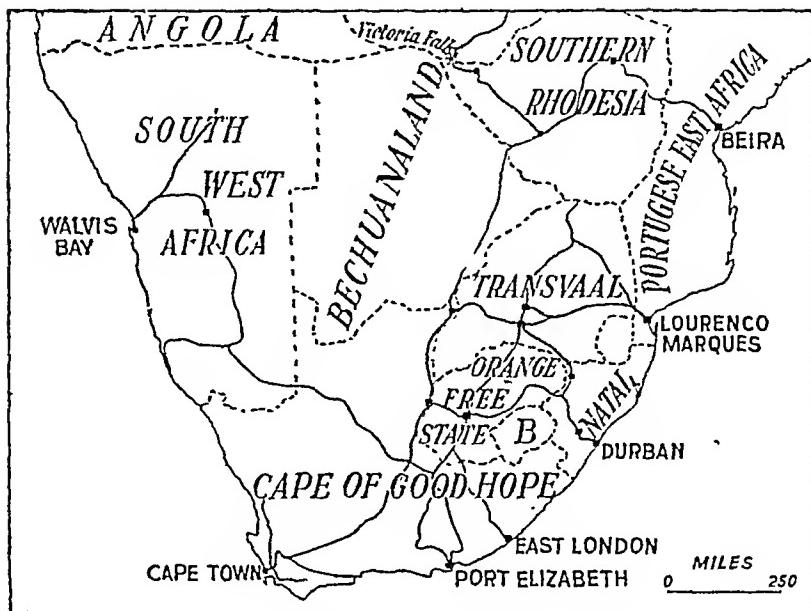


FIG. 380.—The railways of South Africa.

Study this map carefully by taking each port in turn; notice the railway running from it to the interior and the part of South Africa served by each port. Identify all the towns marked by a square dot. The railway disappearing at the top of the map—across the wonderful bridge at Victoria Falls, on the Zambezi, may one day become the Cape to Cairo Railway.

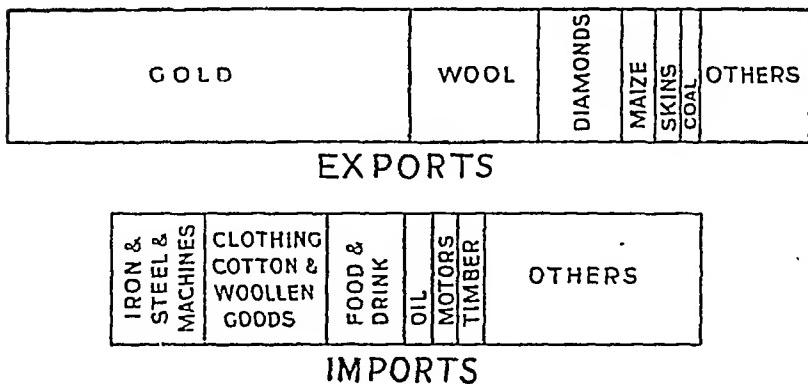


FIG. 381.—The trade of South Africa. The total trade is very roughly one-third of that of India.

Walvis Bay, and the chief town Windhock, but they are not very important.

**Railways of South Africa.**—Notice carefully the railways shown on the map, and the hinterlands of the chief ports.

**Trade of the Union of South Africa.**—By far the most important exports are gold and wool. The imports are manufactured goods, for South Africa has not yet developed its own factories.

## RHODESIA

The British Colonies of N. and S. Rhodesia are one-fourth the size of the whole of India and Burma. They lie entirely on the African Plateau, but there are lowlands along the great rivers such as the Limpopo and Zambesi. At present there are fewer people in Rhodesia than there are in Calcutta and its suburbs. But the land is very suitable for agriculture, fruit farming, cattle and sheep rearing, and progress is now being made rapidly. Northern Rhodesia supplies the Katanga mining district of Belgian Congo with foodstuffs and coal. The coal is obtained at Wankie, in Southern Rhodesia. Southern Rhodesia is more developed than Northern Rhodesia, and there are numerous large cattle ranches. The nearest outlet of Rhodesia is through the Portuguese port of Beira. Parts of Northern Rhodesia suffer from the tsetse fly, whose bite is fatal to cattle and horses. The tsetse fly belts are great obstacles to development and progress. Southern Rhodesia is rich in minerals, including gold. Northern Rhodesia has valuable copper mines.

**The Cape to Cairo Railway.**—Many years ago Cecil Rhodes, a great pioneer in South Africa, planned a railway which should run from South Africa (Cape Town) to North Africa (Cairo), if possible through British territory the whole way. It is not finished ; indeed, large parts are not even planned in detail. A direct railway runs from Northern Rhodesia to Cape Town, crossing the great river

Zambesi by a wonderful bridge at the Victoria Falls. In North Africa it is possible to travel from the southern borders of the Sudan to Cairo by river steamer and train, but between Northern Rhodesia and the Sudan there are still several gaps with neither railway nor river routes, and where the only way to travel is to trek through the jungle

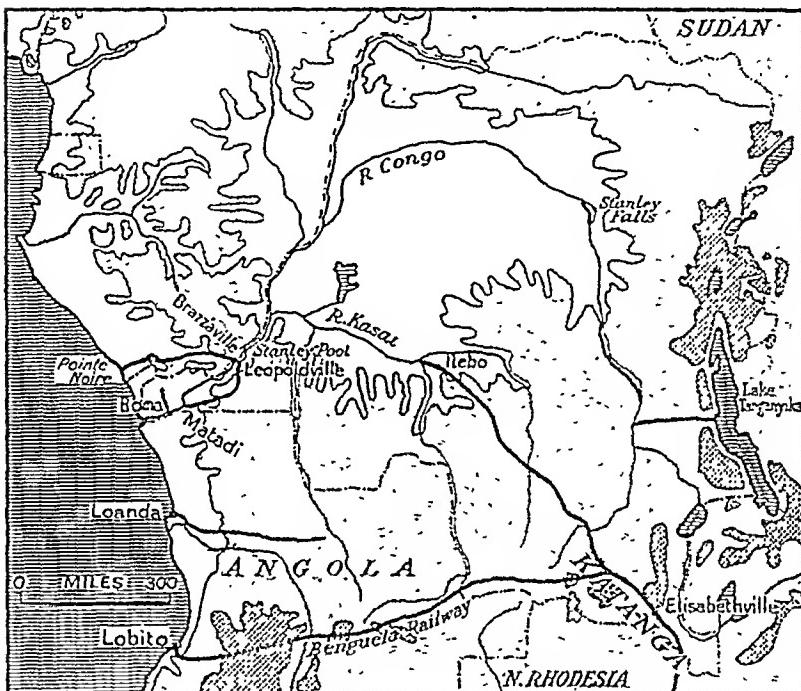


FIG. 382.—The Belgian Congo.

Land over 1300 feet, light dots; highlands over 5000 feet, heavy dots.  
Note the railways.

with native carriers. It is impossible to use horses or cattle owing to the tsetse fly.

### ANGOLA

Angola is a quarter the size of the whole of the Indian Empire—or as large as Bombay, Madras, Bengal, Bihar, and Orissa together. Yet it has only about as many people

as the small district of Orissa. It has been a Portuguese possession since 1575. Yet there are huge areas of good grassland on the plateau, and one day cattle rearing may become important. A railway—the Benguela railway—has been built from Lobito Bay into the heart of Africa, and soon Lobito will become a big “side door” into Africa. The capital, also a port, is Loanda.

### THE BELGIAN CONGO

The Belgian Congo occupies the greater part of the basin of the great Congo River. The basin forms a saucer-shaped depression in the surface of the plateau of Africa. The floor of the “saucer” is about 1000 feet above sea-level. The Congo and many of its tributaries rise in the south on the high plateau of South Africa. The main river drops into its basin by a series of rapids or falls, and flows northwards as a navigable waterway as far as the Stanley Falls. From the Stanley Falls the river swings westwards and is navigable as far as Stanley Pool. Then the river drops rapidly by a series of rapids to the coast. Compare this with the River Nile. The equator passes through the Congo Basin, and so the basin has a high temperature with heavy equatorial rains. All the lowlands are covered with dense evergreen forests. The highlands surrounding the basin, and sometimes the ridges between the rivers, are covered with savanna or grassland.

The Forest is thinly peopled, because

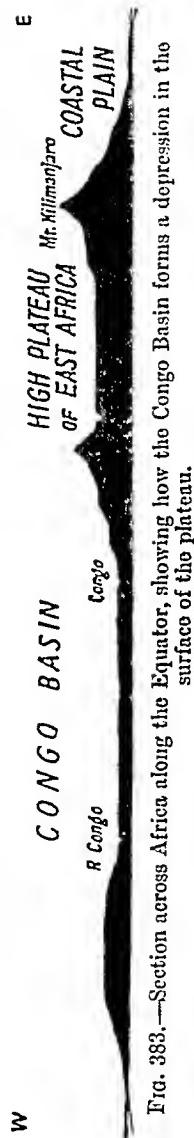


FIG. 383.—Section across Africa along the Equator, showing how the Congo Basin forms a depression in the surface of the plateau.

it is difficult to cut down the dense forest even to grow a few crops. It is in these dense forests that the pygmies live. They are amongst the least civilised human beings. Elephants are numerous in the forests and ivory is an important product. Many trees in the forests yield rubber, but greedy men, anxious to get rich quickly, have cut down nearly all the rubber trees which can be reached easily. The oil palm yields palm oil and palm kernels, used in soap making. Copal is a sticky substance, rather like resin, obtained from certain trees.

Katanga, a portion of the plateau on the south, has become very important recently because of its rich mineral deposits. Copper is the chief metal, and Elisabethville the chief mining centre. Coal and food for the miners are obtained from Rhodesia. Notice that Katanga lies right in the heart of Africa. There are at present three main ways in or out. One is by the Benguella railway, one is by railway through Rhodesia to Beira, the third is across Lake Tanganyika and the British colony of Tanganyika to Dar-es-Salaam.

**Communications.**—Study Fig. 382 carefully, and notice how railways have been built where there are rapids on the rivers. One is from the port of Matadi to Leopoldville; another is round the Stanley Falls; a third runs from the Katanga to the Kasai river. Notice the short railway joining the Congo and Lake Tanganyika.

**Trade.**—The Belgian Congo is developing rapidly. Its trade in 1922 was rather more than that of Burma or Sind. Fig. 384 shows the principal items.

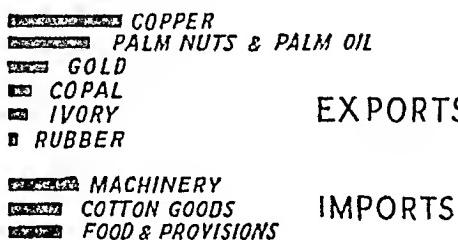


FIG. 384.—The trade of the Belgian Congo.

Compare this with the trade of other equatorial countries such as Malaya. The diagram is drawn on the same scale.

## THE WEST COAST, OR GUINEA COAST

From Cape Verde in latitude 15° N. to the mouth of the River Congo in latitude 6° S. is roughly 3000 miles. Along this coast there are four British colonies, seven strips of French territory, a Portuguese colony, a Spanish colony, and a Negro republic. All these small countries have certain things in common. They may all be divided into two parts :

(1) *A Coastal Plain* with a heavy rainfall. The rain falls mainly in the summer months, but the climate is hot and damp all the year. The natural vegetation is evergreen forest of equatorial type in the wetter parts, deciduous forest in the drier. Mahogany, ebony, and other hard timbers are obtained from the forests, but more important is the oil palm from which palm oil and palm kernels are obtained and exported. Wild rubber is collected, and rubber plantations have been started in many places. In some parts (Gold Coast and the island of San Thomé) much cocoa is produced from the beans of the cacao tree. Rice is a favourite food of the natives, together with manioc and maize. Kola nuts take the same place as betel nuts in India. Notice, too, that on the west coast of Africa the oil palm has taken the place of the coconut.

(2) *The Plateau Regions*, with a smaller rainfall and poorer soil. The temperature, owing to the height above sea-level, is lower and the natural vegetation is savanna. The crops grown are mainly for the use of the natives—millet (including the Indian *jowar* which is called Guinea Corn), maize and rice for food and cotton for clothing. Ground-nuts yield food and oil.

The old hard rocks of the plateau are sometimes rich in minerals. Much tin is obtained from Nigeria, gold and manganese from the Gold Coast. Coal is mined in Southern Nigeria.

*Gambia* is a small British colony.

*Sierra Leone* is another British colony. Its capital, Freetown, has a good harbour and is a coaling station.

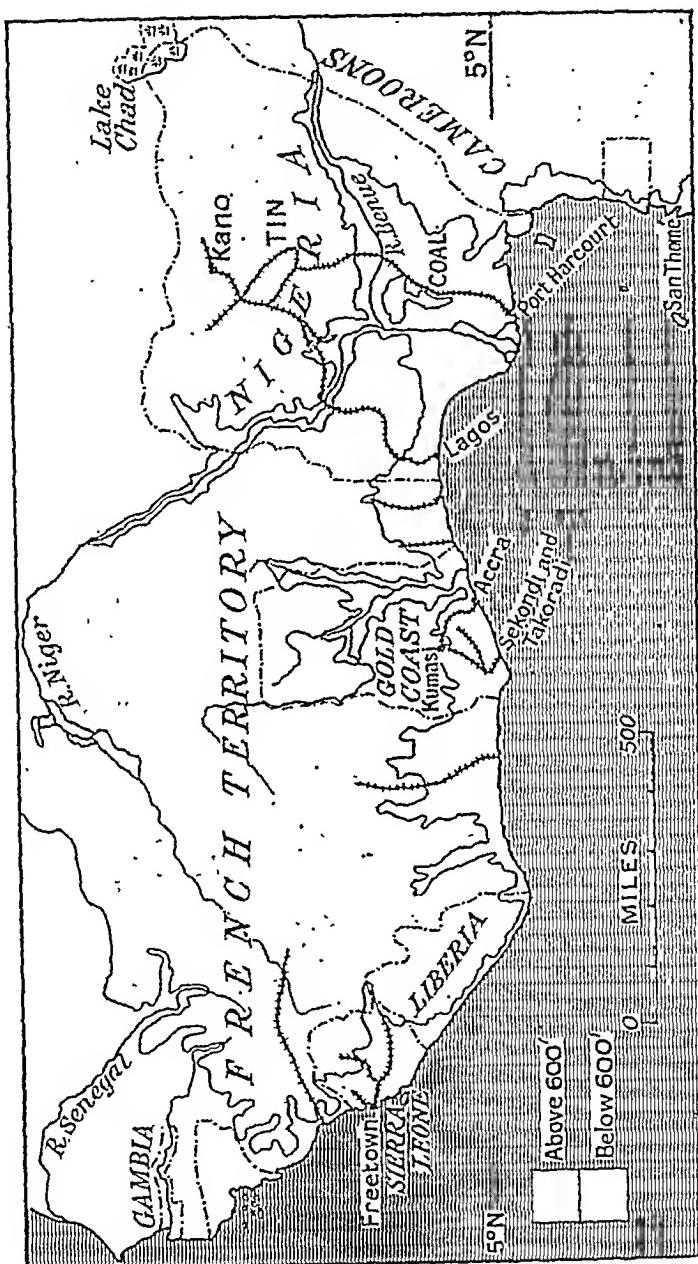


FIG. 385.—The West Coast of Africa.

Note the railway development in Nigeria and the Gold Coast.

*Gold Coast* is also part of the British Empire. There are railways from the coast to Kumasi.

*Nigeria* is the largest British colony. Its port is Lagos. Notice the course of the River Niger which, like other African rivers, is navigable in its upper course but is interrupted by rapids where it descends from the plateau. So a railway has been built from Lagos to a point on the river above the rapids.

*Liberia* is a republic which was founded for negro slaves liberated from America. It is in a very backward state.

## SAHARA

The great desert of Northern Africa forms nominally part of the possessions of France. The greater part is a vast sandy or rocky waste, without tree or grass, and forming the largest desert in the world. Scattered about the desert in hollows are more fertile patches of land known as oases. Wherever water is available, an oasis is sure to occur. Some of them consist simply of a few palm trees clustered round a well or pool, others are quite large tracts of grassland or scrubland where cultivation is possible. The inhabitants of the Sahara consist of:

- (1) The inhabitants of the larger oases,
- (2) The Arab traders who boldly cross the desert by means of camel caravans.

Across the vast desert are caravan routes which are followed by the traders and their camels. Along the north and south of the desert are trading stations where the Arab traders sell their goods to the people of the savannas or the people of the Mediterranean States. In the south are Timbuktu, near the River Niger, and Kano in Northern Nigeria. In the north are several places now joined by railway with the Mediterranean coast.

The north-eastern part of the desert, Libya, is Italian territory; the eastern part has already been described under Egypt.

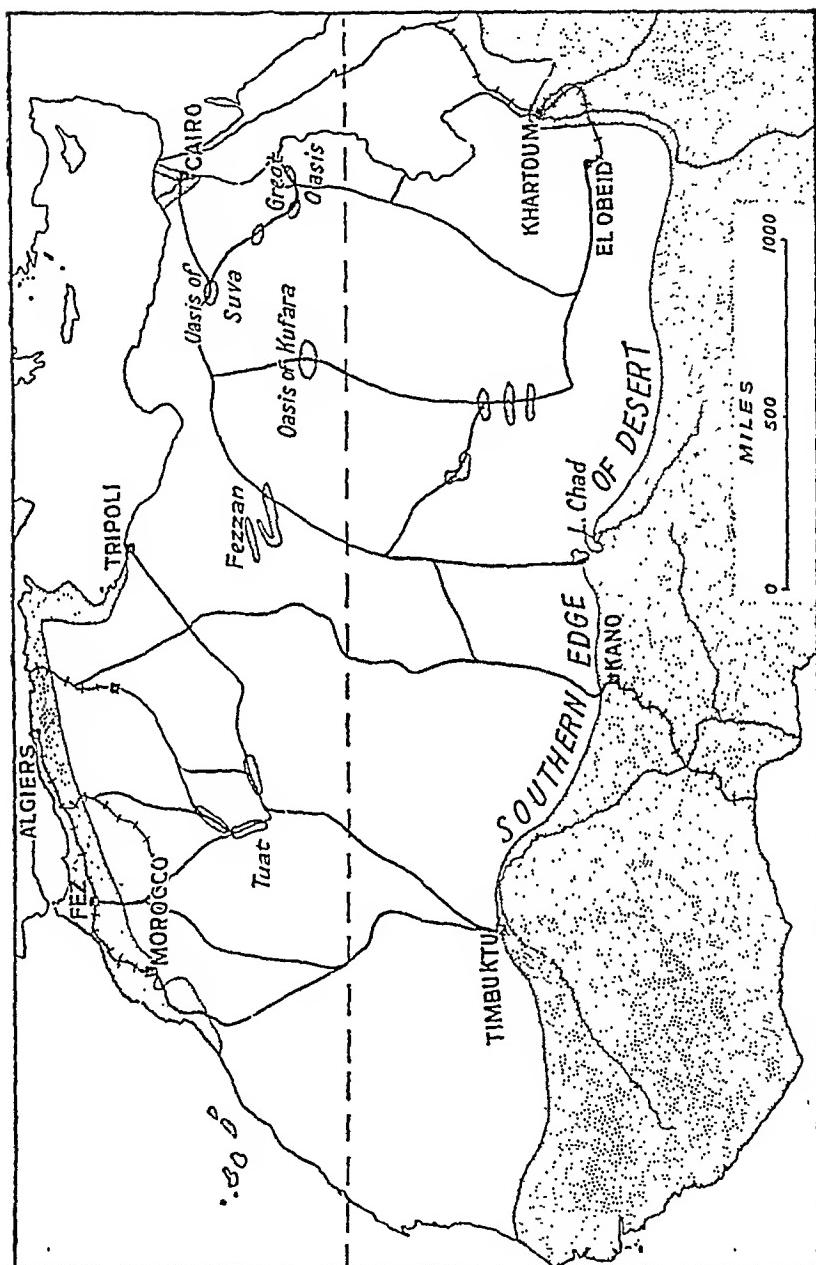


FIG. 386.—The camel caravan routes across the Sahara.  
The desert is left white, savanna or forest lands on either side dotted. If a camel caravan travels 40 miles a day, how long would it take to get from Timbuktu to Tripoli?

## ISLANDS OF AFRICA

Madagascar is a large island with a plateau in the centre. Dense forests which produce a little rubber are found on the east. It is a French possession. Hides are exported, but the island is little developed.

Mauritius, in the Indian Ocean, is a British possession and a port of call (the port is called Port Louis). It grows cane-sugar, most of which is sent to India. Near by is the French island of Réunion.

St. Helena and Ascension are tiny volcanic islands in the Atlantic Ocean belonging to Britain.

Canary Islands (Spanish), Azores, Madeira, and Cape Verde Islands (all Portuguese) lie off the north-west coast of Africa. They grow bananas and other fruit for export to England and Germany.

### QUESTIONS AND EXERCISES

1. Compare and contrast the Congo Basin with the Amazon Basin with regard to position, physical features, climate, vegetation, and products.
2. Write an account of the people of Africa, mentioning the various races and where they live.
3. Compare the Nile and the Indus Basins.
4. Describe the railways of Africa.
5. What is meant by the "swing of the wind systems"? What effect has it on the climate of Africa?
6. Describe a journey by caravan from Tunis to Timbuktu.
7. Describe fully the high plateau of South Africa.
8. Compare and contrast Abyssinia with Kashmir.
9. Write an account of the mineral wealth of Africa.
10. Draw a sketch-map showing the British Empire in Africa.
11. Why do you think large numbers of Indians have emigrated to Africa?
12. If you were to be made a governor of part of Africa, which part would you choose, and why?
13. Compare the grasslands of South Africa with those of South America. In what ways do they differ?
14. What would be the advantages of the Cape to Cairo Railway?
15. What do you know of the cotton-growing regions of Africa and of their importance in the present and the future?
16. Describe a journey across Africa, from the mouth of the Congo to Durban. Say exactly how you would go.

## F. AUSTRALIA AND NEW ZEALAND

### 1. POSITION AND SIZE

AUSTRALIA, even including the islands of New Guinea, New Zealand and Tasmania, and a very large number of islands which lie scattered over the face of the Pacific Ocean, is by far the smallest of the continents. With its 3,000,000

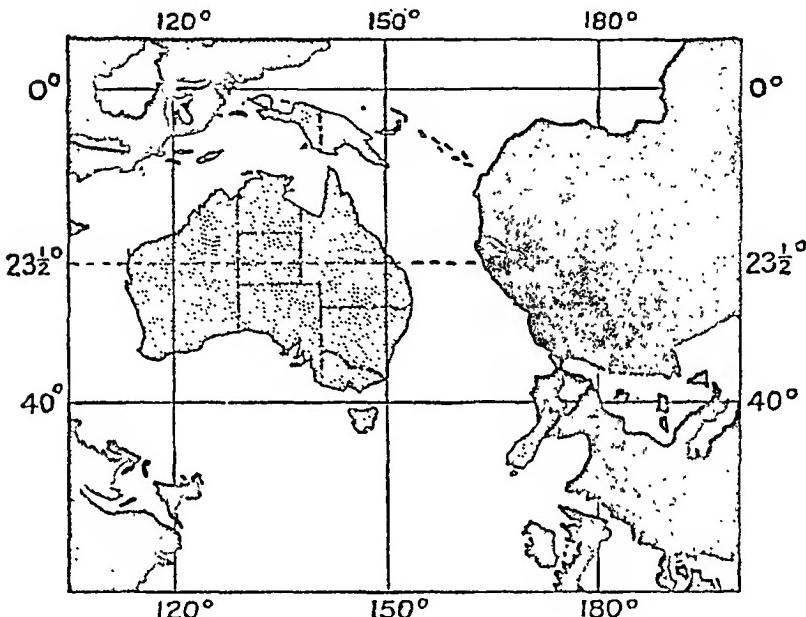


FIG. 387.—The position and size of Australasia.

The black areas are the land on the opposite side of the world.

square miles Australia proper—*i.e.* the island continent including Tasmania—compares in size with the United States or Canada. In position, we may note that the Tropic of Capricorn cuts the continent of Australia almost in half, so that the northern half lies in the Tropics and the

southern half in the South Temperate Zone. The latitude of 40° S. passes through Bass Strait between Australia and Tasmania, and also passes through the North Island of New Zealand, just north of Wellington. Longitude 135° E. almost cuts Australia into two halves. Notice the remoteness of Australia and New Zealand from the principal countries of the world. That helps to explain why they remained so long unknown and undeveloped.

## 2. PHYSICAL FEATURES

We will deal first with Australia itself, leaving New Zealand and New Guinea for separate description later.

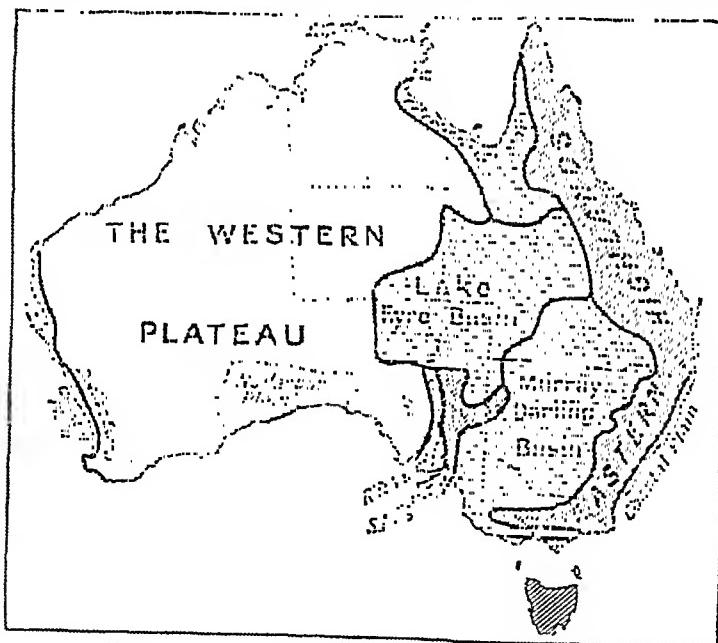


FIG. 388.—The main physical features of Australia.

Australia falls naturally into three physical divisions :

(a) A great western plateau, mostly between 600 and 1500 feet above sea-level.

(b) A central lowland, or succession of low-lying basins, some of which are areas of inland drainage and part actually below sea-level.

(c) The eastern mountains. These mountains are not fold mountains, but are really formed by the edge of a plateau, which slopes gradually from east to west. The whole range is often called the "Great Dividing Range," but different parts have different names—Blue Mountains



{Photo : L. D. Stamp.

FIG. 389.—The Blue Mountains, New South Wales.

The photograph shows that the mountains are not fold mountains, but are simply the edge of a plateau.

in New South Wales, Australian Alps in Victoria. The gentle slope to the west is the great grassland region, of which the Darling Downs of Queensland are part. There is only a very narrow plain between the mountainous edge of the plateau and the sea, but it forms a rich and important region.

There is only one important river system in Australia—that is the Murray-Darling. Notice how the streams

rise from the Dividing Range and flow westwards down the gentle plateau slope.

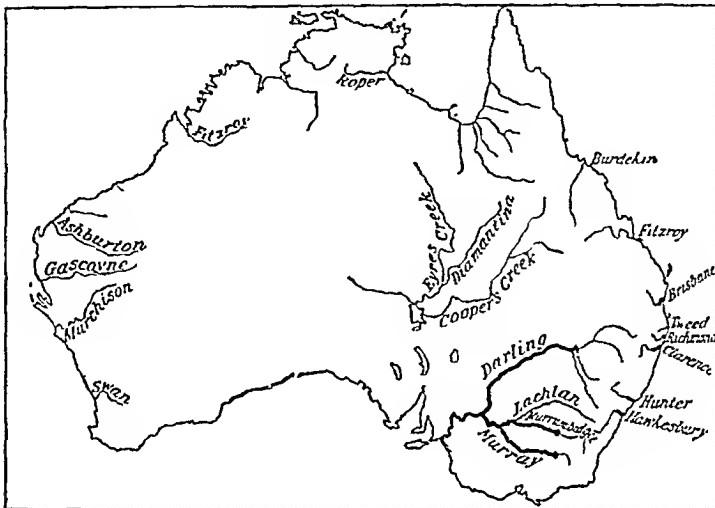


FIG. 390.—The rivers of Australia,  
Principal navigable portions shown dark.

### 3. GEOLOGY AND MINERALS

As a whole Australia is rich in minerals. Most of the western plateau is a great mass of old crystalline rocks, and in the midst of the dry regions of Western Australia are several famous goldfields, especially at Kalgoorlie. The eastern part of Australia is also rich in minerals. Victoria has the famous goldfields of Ballarat and Bendigo, and copper is important in Queensland. It was the attraction of gold which first brought large numbers of white settlers to Australia, though when the rich gold lands became exhausted they turned to farming. In New South Wales is a big isolated hill, known as "Broken Hill," with the richest deposits of silver-lead ore in the world. Both Queensland and New South Wales have good coal, but the great basin in New South Wales (the largest in the Southern

Hemisphere) is especially important because it is right on the east coast and coal can be loaded almost direct from the mines into ocean steamers. The coal is worked especially near Newcastle (north of Sydney) and south of Sydney. The annual value of the coal raised is now roughly equal to that of all other minerals put together. Australia also has rich deposits of iron ore, but the best, such as those of Iron Knob, South Australia, are far from the coalfields.

It has already been noted that the ground slopes gently

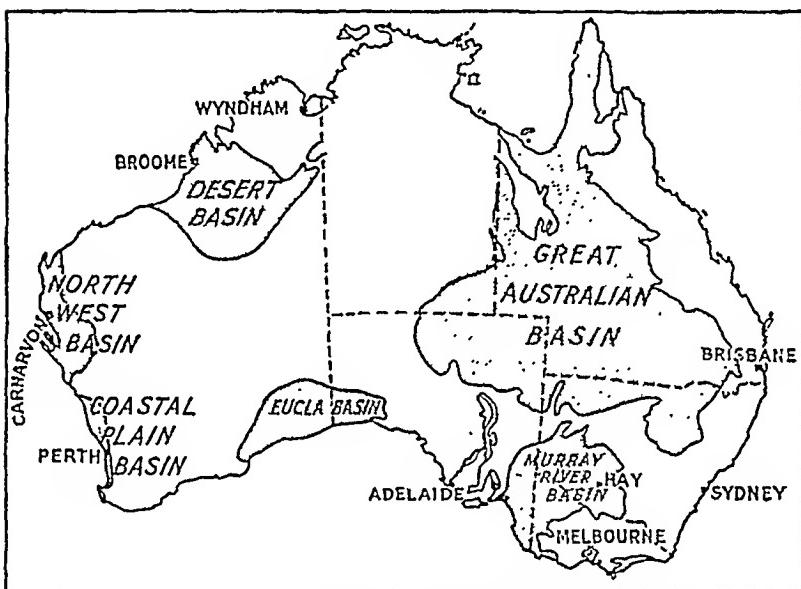


FIG. 391.—The artesian basins of Australia.

The most important is the Great Australian Basin. In some of the others, such as the Eucla Basin, the water is too salt to be of much use.

westwards from the crest of the Dividing Range towards the central valley. This slope is an area without very much water, for the Dividing Range cuts off the rain-bearing easterly winds. Fortunately in this great region, stretching from the south of Queensland through New South Wales into Victoria, the rocks are arranged in the form of basins, and so "artesian wells" can be bored as shown in Fig. 64. The water from these wells has

enabled large areas of dry country to be formed into rich cattle-rearing and sheep-rearing country. There is one great puzzle, however ; Australian geologists cannot decide whether the water will one day be entirely used up, or whether the supply is being renewed underground by the rain which falls every year and sinks into the ground in other parts of Australia.

#### 4. CLIMATE

Remember that we have said the Tropic of Capricorn passes through the centre of Australia, and you can compare the northern half of the continent with India. In India, when the sun is shining vertically over the Tropic of Cancer, the land mass of the Ganges Valley and N.W. India becomes very much heated, and this, as you know, is the principal cause of the monsoon. In Australia, when the sun is shining vertically over the Tropic of Capricorn, the central land mass becomes very heated and later causes a monsoon. The northern shores of Australia are, therefore, typical monsoon lands, but remember the monsoon wind blows from the north-west (how do you explain this ?) and the rain falls from November to April. The east of Australia comes under the influence of the South-East Trade Winds. These winds are, however, drained of their moisture by the Great Dividing Range, and the whole of the centre of Australia receives very little rain indeed. You will notice that the centre of the continent lies in the same latitude as the other great deserts of the world—the Kalahari, Atacama, Mexican, Sahara, Arabian and Great Indian Deserts. The south of Australia enjoys a Mediterranean climate. In the southern summer it is in the dry hot belt, but in winter comes under the influence of westerly winds. Compare its latitude with other Mediterranean belts in the world.

Tasmania and New Zealand enjoy a moist temperate climate very like that of England. As we shall see later, the physical features of New Zealand make a great deal of difference to its rainfall.

Apart from the fact that a great part of Australia receives very little rain, the amount which falls is very irregular. In some years there may be no rain at all and the farmers lose a great many of their sheep and cattle, though the danger of water shortage is not as great as it was before the development of the artesian basins.

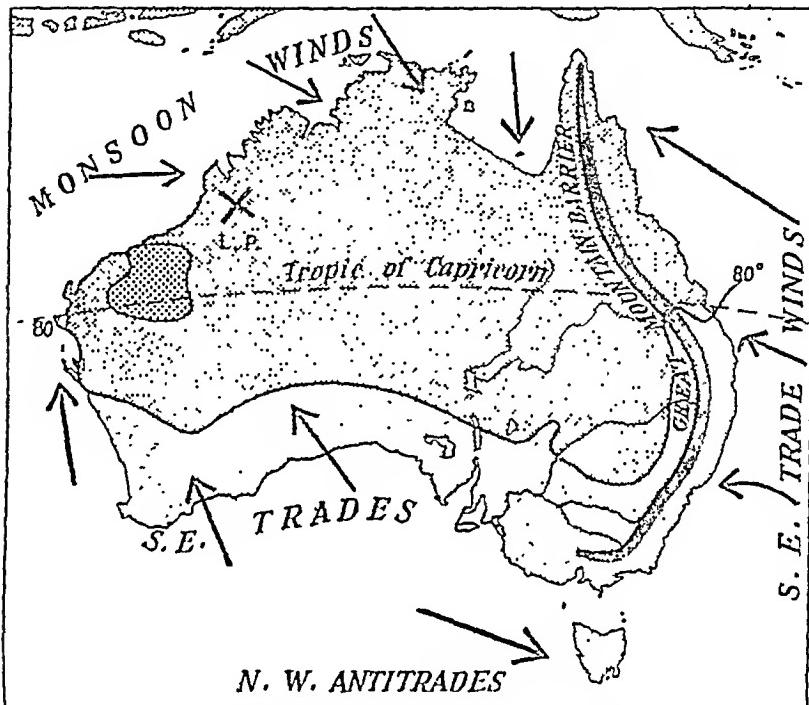


FIG. 392.—Climatic conditions in the hot season (November to April).

Notice the Low Pressure centre (L.P.) in the north caused by the great heat, and notice the monsoon winds which it causes. The two arrows in the south-west marked "S.E. Trades" would be more correctly shown blowing from east to west across the land. Along the East Coast local sea-breezes from the north-east are very important during the day-time in the summer. The temperatures shown are the January temperatures.

**Conditions during the Hot Season (November to April).**—At this period of the year the sun is shining vertically almost over the centre of Australia. Notice the large central area—very hot, and parts of it with a temperature of over 90° (shown by the area with large dots on the north-west coast in Fig. 392). The three arrows in

the north-west show the monsoon which is caused. Notice the heavy rain it brings to the northern coast (Fig. 394). Practically the whole of the east coast benefits from the Trade Winds, but notice that only the narrow coastal strip receives heavy rain. Why is this? Note the moderating effect of the sea on the temperature of the east coast. At

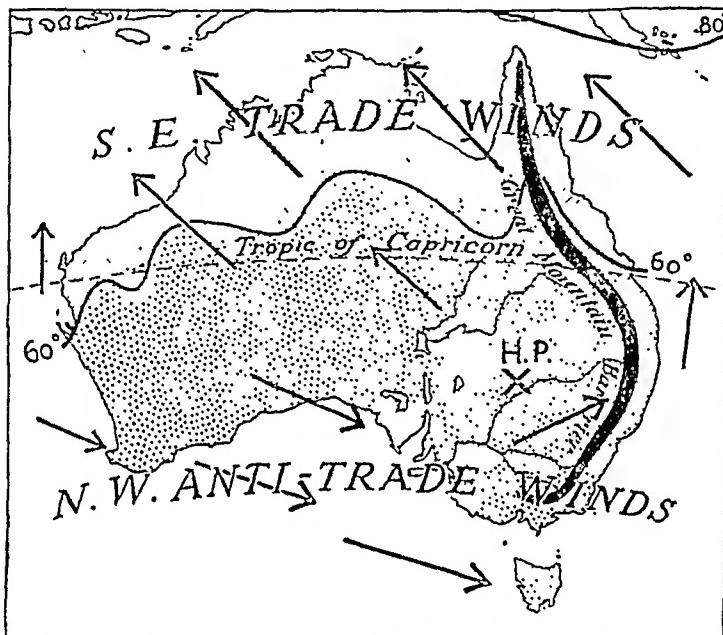


FIG. 393.—Climatic conditions in the cold season (May to October). Notice how the main wind systems have moved northward and that the southern coast comes under the influence of the Anti-Trade Winds. The temperatures shown are the July temperatures.

this period of the year the southern coast is dry—the westerly winds are blowing too far to the south to influence Australia. The hot spells of summer are sometimes interrupted by "southerly busters"—delightful, cool winds from the Antarctic.

Conditions during the Cold Season (May to October).—At this time the sun is far to the north of the equator and the whole of the north is under the influence

of the Trade Winds—blowing except in Queensland from the dry interior. At this season the southern part of the continent comes in the westerly wind belt—hence the warm, moist winter characteristic of the Mediterranean climate. The land loses its heat very quickly compared with the sea, so that the central deserts are now slightly cooler than the sea-coasts. See this by the area having a temperature of less than 60°.



FIG. 394.—The rainfall of Australia.

In the Tropics 20 inches of rainfall may be regarded as roughly a minimum for agricultural development; in the Temperate region 10 inches is sufficient. The 10-inch rainfall line is shown on Fig. 295 as the boundary of the Mediterranean region.

##### 5. CLIMATIC REGIONS AND NATURAL VEGETATION OF AUSTRALIA

We can now combine what we have learnt about physical relief and climate, and divide Australia into natural regions. It is a little difficult to compare the

natural vegetation of Australia with that of the other continents. Most of the trees are "eucalypts," or gum-trees, and are evergreen. So that although there are regions in Australia where deciduous forests would normally grow, the gum-trees there remain evergreen.

(a) *The Tropical Climatic Region.*—The coast is often fringed with mangrove swamps, passing inland to Monsoon or Evergreen Forests which soon give place to rich grasslands or savanas. The forests thus occupy a narrow strip along the coast, and the *Tropical Grasslands* form a transition between the forests of the coast and the dry interior. The grasslands are most important in Queensland, where they form fine cattle-ranching country.

(b) *The Hot Desert Climate* is found over an enormous area, in the heart of Australia, both of the great plateau and of the central lowlands round Lake Eyre. The area of true desert with only the spiny grass (*Spinifex*) and sand occupies a comparatively small area in the centre; surrounding this there is a broad ring of scrubland consisting of "mulga" (*acacia*), "mallee" (*eucalyptus*), or blue-bush and salt-bush.

(c) *The Mediterranean Climate* occurs along the southwestern and southern coasts, including a considerable part of Victoria. In the wetter parts are fine forests.

(d) *The Temperate Grassland Climate* occupies most of the Murray-Darling Basin. The land which slopes down gradually from the crest of the eastern mountains to the central plain is occupied by grassland, but the rainfall is greatest near the mountainous edge of the plateau. Thus the grassland gets poorer from east to west (compare South Africa). In the wetter parts are a fair number of trees.

(e) *The Australian Climatic Region* is found along the seaboard of New South Wales and has a well-distributed rainfall from the Trade Winds, but is also influenced by the Westerlies in winter. It is often classed with the China type of climate, but the winters are not nearly so cold and the rainfall is not monsoonal. The normal vegetation is eucalypt forest.

(f) *The Cool Temperate Oceanic Climate*, like that of England, is found in Tasmania.

There are some specially interesting points to notice about the vegetation and animals of Australia. It is believed that the continent has been separated from other lands for a long, long time, and so its animals and plants

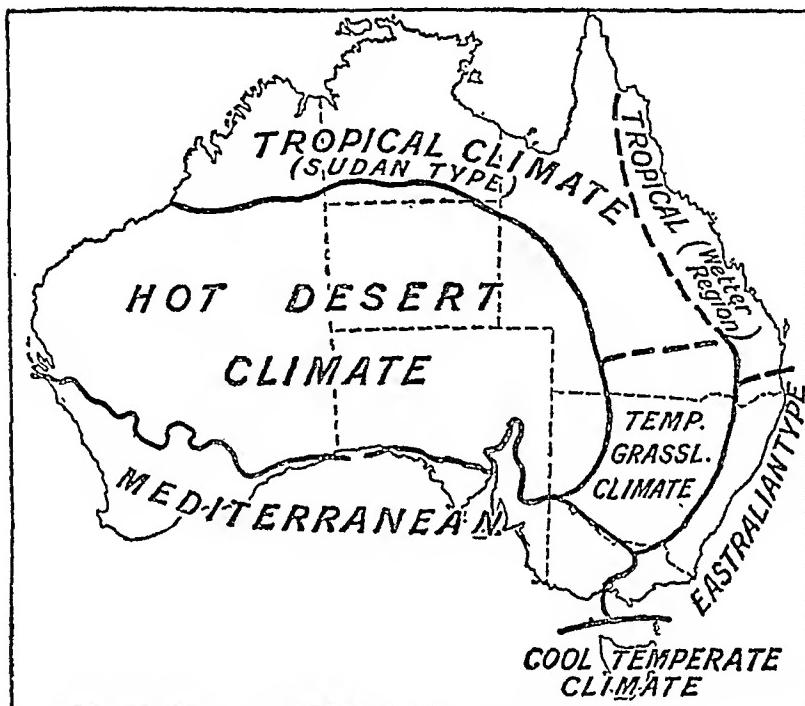


FIG. 395.—The climatic regions of Australia.

are very peculiar. The most interesting plants are the eucalyptus trees, of which there are many kinds. In the drier regions they form only scrubby bushes with small leaves. The trees give very little shade, because their leaves are arranged vertically. This "mallee scrub" of small eucalyptus bushes covers vast areas. In other places the scrub consists of small acacia bushes very like those in the dry parts of India. In the wetter regions—as in

the monsoon lands of the north—the eucalyptus trees grow to enormous size and are important for their wood, which is very hard and will not be eaten by white ants. Economically the most important forests are the karri and jarrah forests of the Mediterranean regions of Western Australia and the fine blue gum and other forests occurring on the hill slopes of New South Wales, Victoria, and Tasmania.

The animals of Australia are still more peculiar. There are many kangaroos, which carry their young in a kind of pouch. Still more curious is the platypus, an animal with a beak like a duck and which lays eggs. Then there are big running birds, such as the emu. In recent years European animals have been introduced into Australia. They have increased at an enormous rate—especially the rabbits—for there have been no enemies to worry them. Rabbits are now so abundant that they are a serious nuisance and do great damage. Western Australia has tried to keep out the rabbits by a wire fence 2000 miles long.



FIG. 396.—The population of Australia.

Each dot represents 500,000 people. Notice the very small population. Compare this map with the ones for the other continents, which are on the same scale.

### 6. POPULATION

When discovered by Europeans about 300 years ago, Australia was inhabited by very wild natives who were so uncivilised that they used stone weapons. There were only a very few of them, and they are decreasing in numbers. In Tasmania they have all died out. The

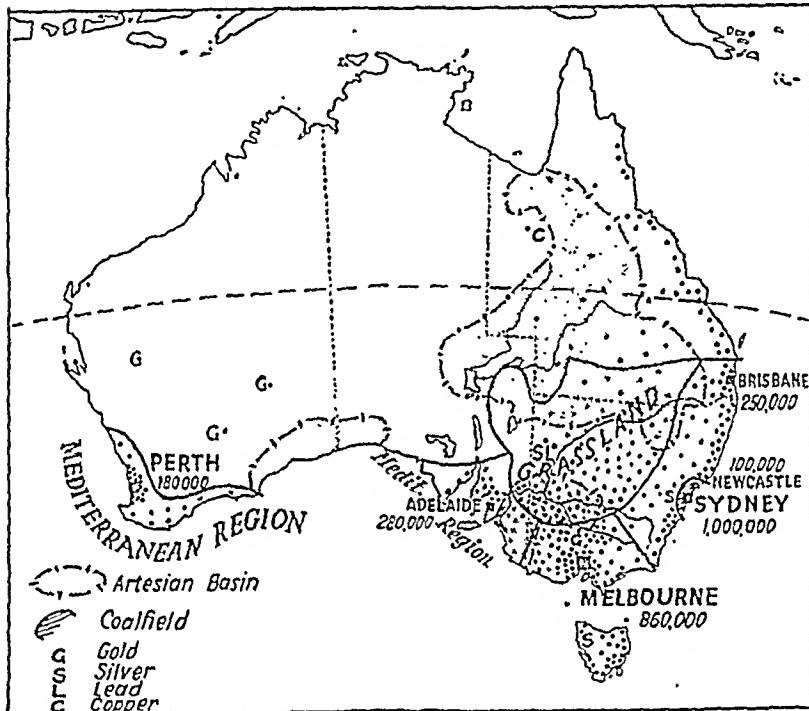


FIG. 397.—Detailed population map of Australia.

Each dot on this map represents 10,000 people. Large towns are shown by a square dot. Notice that most people live in the Mediterranean Regions, the Temperate Grasslands and the Eastern Coasts. Only the three largest artesian basins are shown.

present population of Australia, apart from the few natives, consists almost entirely of white immigrants from Europe. The Australian Government has reserved Australia for white people only. There are various parts of the world which are kept only for natives of various countries—there are parts of North America where there are American-

Indian "reserves," there are parts of New Zealand where only the Maoris may live—but Australia is the only country which the white people have entirely to themselves. Now look at the population map of Australia. The population is very small, but even then notice that the people are nearly all in the Mediterranean Lands and the Temperate East Coast. The Monsoon Lands and Tropical Lands of the north, which one might expect to be thickly populated, have as yet very few people, and are very little developed. One little point you should notice on the map—the patch of people at Kalgoorlie; right away in the dry interior. Why do people live there? One very curious thing about Australia is that more than half the people live in the five big cities of Sydney, Melbourne, Brisbane, Adelaide, and Perth. This is largely because the people who migrate to Australia from Europe have been used to living in cities, and when they get to Australia they do not like to change their life.

#### 7. GOVERNMENT

Australia is governed by the Australian Commonwealth Government and is a part of the British Empire. The whole country is divided into a number of states, which govern their own affairs to a considerable extent. There is a very small area in the healthy hills near Sydney which actually belongs to the Commonwealth Government and the capital, Canberra, is still being built. Directly under the control of the Commonwealth Government are the large, undeveloped tracts of Central and Northern Australia. Until 1901 the states of Australia were quite separate, and this has had one or two very bad results. Each state began building its own railways, usually starting from the capital. Now nearly all the railways are joined up, but there are three different gauges, so it is impossible to travel from one state to another without changing trains. Remembering this we must note there is now a railway from extreme east to extreme west across the south of the continent, and it is hoped soon to build

a railway from north to south right across the centre of Australia. The railway builders found it very difficult to connect the fertile eastern coastlands with the interior owing to the great Dividing Range. Look carefully at the map, Fig. 398, and see how the railway breaks through from Sydney.

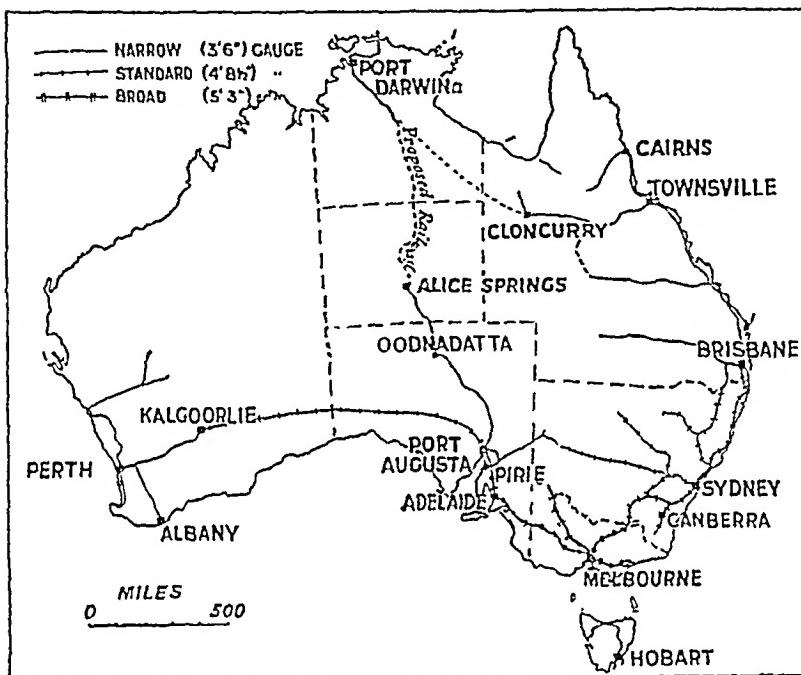


FIG. 398.—Railway map of Australia.

Notice carefully the numerous breaks in railway gauge. Work out a journey from Perth to Brisbane. How many changes of train are necessary, and where are they?

#### 8. TRADE AND WORLD RELATIONS OF AUSTRALIA

As the Commonwealth of Australia embraces the whole of the continent, we may take the trade of all the states together. Australia is a vast land, very thinly peopled as yet, but having a great amount of land waiting development. As one would expect, it is a pastoral and agri-

cultural country. Such industrial occupations as do exist are mainly connected with the utilisation of pastoral and

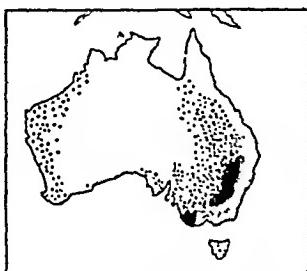


FIG. 399.—The distribution of sheep in Australia.

Each dot represents 250,000 sheep in 1924. Notice that nearly all the sheep are found where the rainfall is between 10 and 30 inches per year, and most of them south of the Tropics.



FIG. 400.—The distribution of cattle in Australia.

Each dot represents 100,000 animals in 1924. Notice that the cattle are found mainly to the east of the sheep regions—that is, on the wetter grasslands and richer parts of the grasslands.

agricultural produce. Consequently, Australia exports a considerable part of its natural products and takes manu-



FIG. 401.—The wheatlands of Australia.

Notice that they occupy roughly the same areas as the sheep. Each dot represents a yield of 500,000 bushels

in the Tropic of Capricorn, and nearly all

where the rainfall is between 10 and 40 inches per year—especially between 20 and 30.

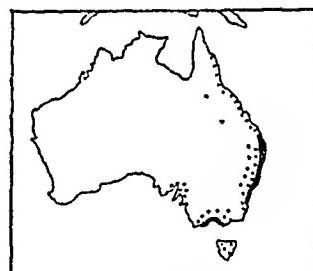


FIG. 402.—The dairy farming regions of Australia.

Notice their location on the wet east coast. Compare England.

factured goods in exchange. In addition to agricultural and pastoral products Australia is rich in minerals, and so

gold, copper, silver, and lead are important exports. The agricultural and pastoral products depend upon the climate of Australia. There is a large area of monsoon and tropical land, but it is little developed and the only noteworthy export typical of these regions is sugar (from Queensland). At least enough sugar for the whole continent is produced. Then there is land with a Mediterranean climate—pro-

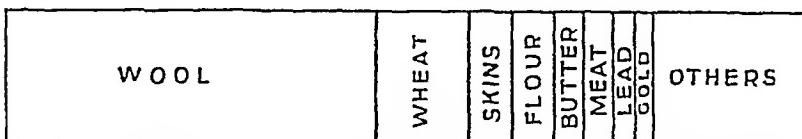


FIG. 403.—The exports of Australia in 1923-24, a typical post-War year.  
The total value of the exports is about £150,000,000 (1924-1920).

ducing and exporting oranges, wine, wheat, tinned fruits, etc. The forested part of this region (in S.W. Australia and Victoria) produces good hard timber. Victoria and Tasmania grow and export apples. But the grasslands are some of the most important lands of Australia, and produce huge quantities of wool, mutton (see Fig. 399 for the distribution of sheep), hides (for leather), as well as wheat

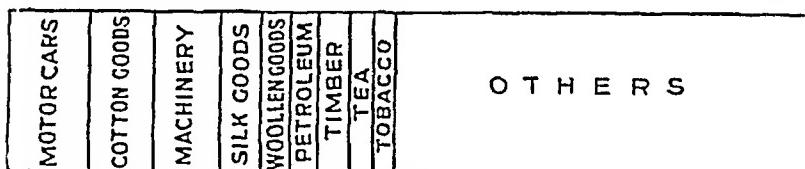


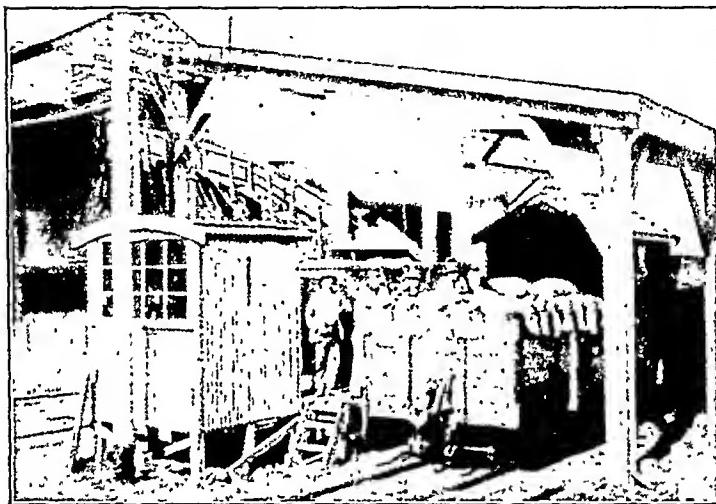
FIG. 404.—The imports of Australia.  
The total value of the imports is slightly more than that of the exports. Other items include iron and steel, other metal goods and paper.

(see Fig. 401) and other grains. The first diagram above shows the relative importance of all these exports; the second diagram shows the imports.

The Australian Government has what is called a "Preferential Tariff System." Goods coming into the country are taxed, but the tax is much less on goods coming from the United Kingdom or Canada or New Zealand. This is one way in which Australia helps the

members of the Empire and they in turn help Australia. Naturally the main exchange must be between Australia and an industrial country. Nearly half the total trade is with Great Britain. United States and Japan also share largely, whilst large quantities of exports go to France, Italy, Belgium, and Germany.

Now notice the position of Australia in relation to world trade. The great ocean routes from Europe, Africa, and



[Photo: L. D. Stamp]

FIG. 405.—Handling wheat in bags.

Notice the railway truck full of bags of wheat. The men are loading them on a carrier which takes them into the shed. Some of the bags can be seen being carried up. On the other side of the shed is the quay to which steamers come.

Asia touch Western Australia (Fremantle) first. In some ways Fremantle is to Australia what Bombay is to India, for there the mails are unloaded and sent rapidly by train to all the other states (except North Australia). From Fremantle the steamers go to Adelaide, Melbourne, Sydney, and Brisbane. Less important is the route round the north of Australia, calling at Brisbane first. Many tramp-steamer follow this route, but from Europe it is less direct.

Running parallel to the shore of Queensland is a great bank of coral, called the Great Barrier Reef. Between the reef and the land is beautifully calm water, but steamers have to be very careful not to run on the reef. So dangerous is it that sailing ships do not travel by night.

The Panama Canal has made a great difference to Australia; more than half the trade between New Zealand and Europe now passes through the Panama Canal. Sydney is the most convenient port of Australia in connection with the Panama Canal route.

### WESTERN AUSTRALIA

This is the largest state, occupying one-third of the whole of Australia, but a large part is very arid. In the north the fertile monsoon country is as yet little

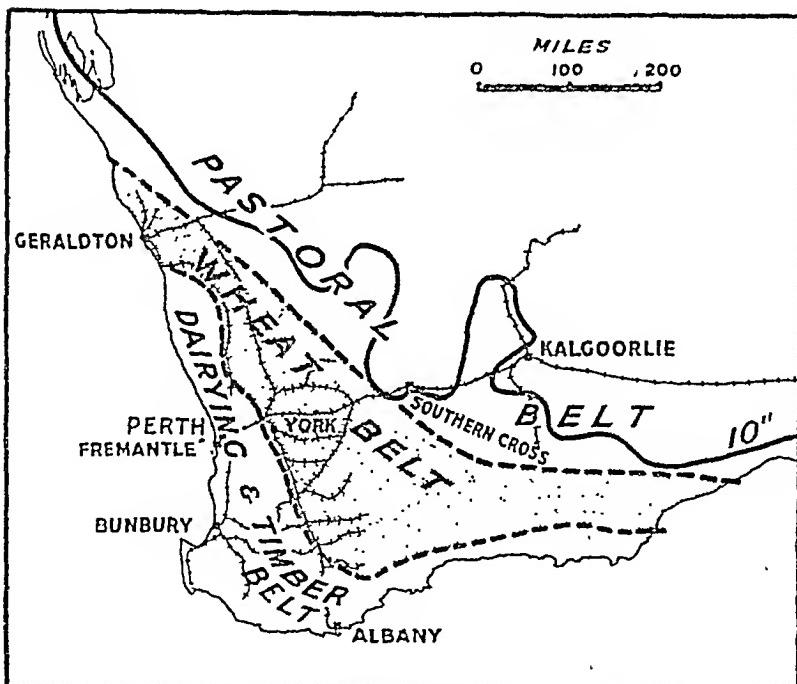


FIG. 406.—Swanland.

developed and nearly all the people live in the Mediterranean lands to the south-west, where we find Perth, the capital, and its port Fremantle. (Fig. 397 shows the distribution of people.) Large stretches of the coast-line are unbroken and there are few good harbours—an exception is the fine port of Albany. We must not forget the gold-mining centres. The south-western part of Australia can grow the vine and many Mediterranean products, as well as wheat, barley, and oats, whilst there is much grass-land suitable for sheep. Western Australia is more than half of the size of the whole of India, but the total number of people is less than half a million.

### NORTH AUSTRALIA AND CENTRAL AUSTRALIA

These states are at present almost uninhabited. There is a fringe of forests and mangrove swamps, but farther inland is a broad belt of savana land with good grass ideal for cattle. The one town of North Australia, Port Darwin, will become much more important when the new north-to-south railway is finished. Alice Springs is to be the administrative centre of Central Australia.

### SOUTH AUSTRALIA

The northern part of Southern Australia is a dry area of inland drainage. In an atlas, however, several long rivers are marked, flowing into a big lake named Lake Eyre. Really these rivers are only filled with water perhaps a few days in the year, and at other times are dry. Lake Eyre, too, for most of the year, is a flat marshy area with a few large pools here and there.

The southern part of the country lies in the Mediterranean region, and is the only part of importance. Scrub-lands, capable of supporting a few sheep, occur along the railway to Western Australia in the area known as the Nullarbor Plains. But the most developed parts at

present are around Adelaide and on the borders of Victoria and New South Wales to the south-east. It is in that region that the Murray-Darling flows into the lagoon known as Lake Alexandrina and then into the sea. Unfortunately sandbanks at the mouth prevent ocean steamers going directly up the river. Indeed, the South Australians value the Murray River mainly for purposes of irrigation, and in the irrigated area there are fine vineyards and fruit orchards.

Most of the coast of South Australia is unbroken and fringed by cliffs, but there are two big gulfs—Spencer Gulf and St. Vincent Gulf. Adelaide, the capital of the state, is situated near the latter gulf; its port is Port Adelaide. South Australia in some ways benefits from its neighbours. All the silver and lead from Broken Hill (New South Wales) are brought down by rail and exported through Pirie in South Australia. Much of the produce of the Murray-Darling Basin is also exported through South Australia.

## VICTORIA

Though the smallest, Victoria is in many ways the most important of the Australian states. The eastern mountains, here known as the Australian Alps, swing round to become almost east and west in Victoria, and so cut the country into two halves—a northern and a southern. Notice from Fig. 407 the fine position of Melbourne and its communications. Then note the clear division of the country into four parts:

- (1) The Great Plains to the north (low rainfall).
- (2) The Australian Alps and Great Dividing Range.
- (3) The Great Valley (moderate rainfall).
- (4) The Otway and Gippsland Hills—a low plateau.

(1) *The Great Plains* form part of the Murray Basin, and parts of them are irrigated (especially around Mildura) and yield Mediterranean fruits. The most important crop

is, however, wheat, whilst enormous numbers of sheep are reared.



FIG. 407.—The natural regions of Victoria.

- (2) *The Australian Alps are built of old rocks and so, as one might expect, are the location of the mining districts*

—Bendigo, Ballarat, etc. The hills are forested, and the timber is of considerable value.

(3) *The Great Valley* is a fertile region devoted to dairy farming (note that the rainfall is heavier than that of the Murray Basin) and general farming.

(4) *The Otway and Gippsland Hills* are forested.

Note carefully the position of Melbourne. It can be reached direct by most ships, but big ships stop at Port Melbourne (east) or Geelong (west) in the great harbour of Port Phillip.

### NEW SOUTH WALES

New South Wales falls very simply into two divisions :

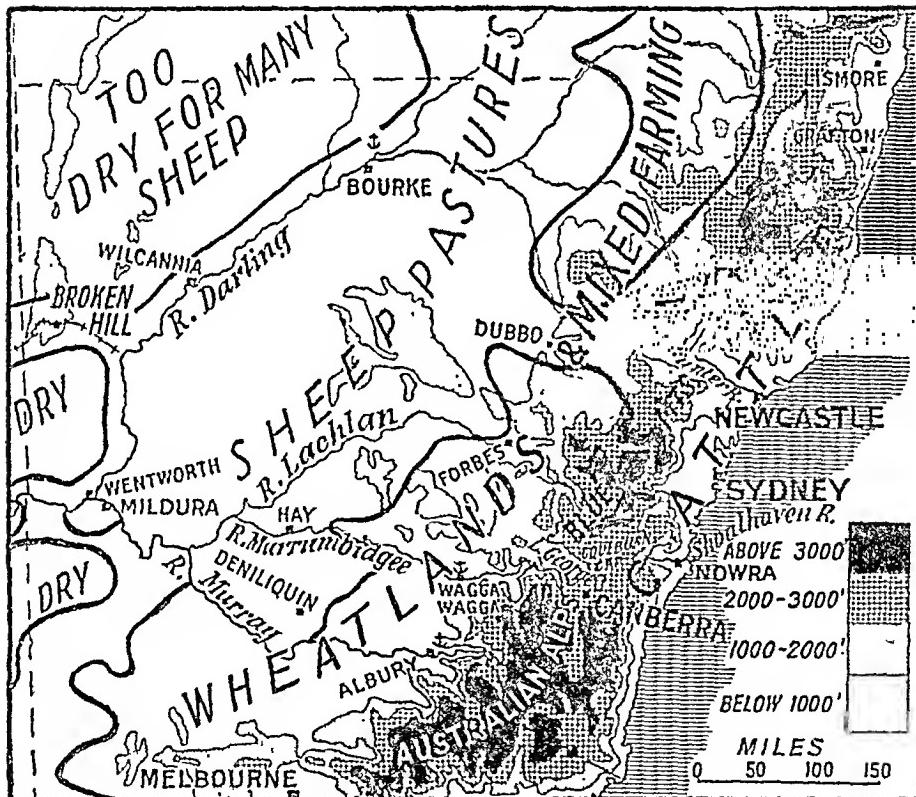


FIG. 408.—New South Wales.

(a) The narrow coastal region, between the crest of the mountains and the sea.

(b) The Murray-Darling Basin, or Temperate Grassland region, sloping gently westwards.

(a) *The Coastal Plain*, though very narrow, is one of the most important districts of Australia. It grows considerable quantities of maize and, as we should expect from its damp climate, cattle are much more important than sheep (compare Figs. 399 and 400). In this part is the biggest coalfield of Australia. The great coal port of Australia is *Newcastle*. *Sydney*, the capital, a huge city with nearly a million inhabitants, is situated in this part of the state, on one of the finest natural harbours in the world (Port Jackson). Notice its connection by rail north

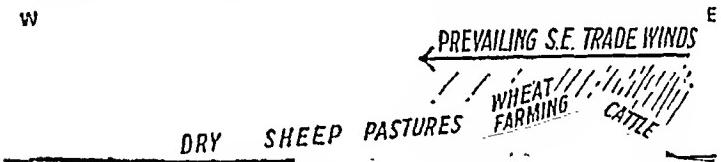


FIG. 409.—Section across New South Wales from west to east.

and south along the coast, and, after overcoming many difficulties, with the interior. The northern part of the plain, watered by the Clarence, Richmond, and Tweed, is particularly fertile.

(b) *The Temperate Grasslands*.—In the wetter eastern regions the grass is rich and suitable for cattle; westwards the slightly drier regions are ideal for wheat and sheep. In the wetter eastern part trees are numerous. Study Figs. 401 and 402 again. To the south-west the important district is the Riverina, between the Murray and Murrumbidgee rivers. The Riverina is a flat area covered with silt which is very fertile, and the rainfall is sufficient for farming and large irrigation works are in progress. Sheep farming is very important in this region also. The Murray and also the Murrumbidgee are fed by the snow from the Australian Alps and so are navigable the whole year, whereas the Darling partly dries up during the year.

The people of New South Wales and Victoria value the Murray as a navigable river, and serious disputes have



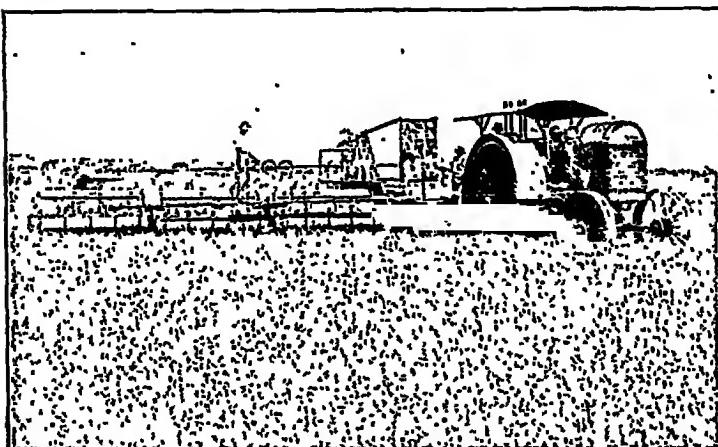
[Photo: Australian Govt. Immigration Dept.]

FIG. 410.—Part of Sydney, New South Wales, from the air.

Notice the many high buildings, more like New York than London. In the foreground is the Circular Quay, from which ferry-boats go to all parts of the famous harbour.

arisen because the people of South Australia wish to use its water for irrigation. Hence the great advantages of a

united government. See what we said about irrigation in India and Egypt which has only been possible under a united government. The drier north-western parts of New South Wales come within the artesian region. Nearly on the border of New South Wales and South Australia is the great mining district of Broken Hill. But nearly all the



[Photo: Australian Govt. Immigration Dept.]

FIG. 411.—Harvesting wheat by machinery.  
This machine cuts the wheat and ties it up into bundles. This one machine cuts a pathway 27 feet wide.

minerals from Broken Hill are exported through Adelaide and Pirie in South Australia, and not through New South Wales at all.

## QUEENSLAND

Queensland falls into two divisions, like those of New South Wales, but the state is farther north and the climate is hotter throughout :

(a) The coastal plains enjoy a tropical climate with good rainfall. They could produce large quantities of sugar, rice, maize, and tropical fruits, etc., but actually

only small quantities are produced owing to labour difficulties and lack of population. Sugar is the most important product. The Great Dividing Range behind the coastal plains includes the mining districts in which Queensland is rich—copper, gold, and tin. Important mining centres are Mount Morgan and Charters Towers. Large coalfields occur, but are too far from present lines of communication to be worked profitably.

(b) The western plains slope down gradually from the crest of the Great Dividing Range. In the wetter regions to the north cattle are important, but in the dry artesian basin of the south sheep are far more important and considerable areas grow wheat. On the border of North Australia are some hills of old rocks with valuable minerals. The Goldfield of Cloncurry is situated here.

Nearly all the important towns of Queensland are on the coast, and serve as outlets to the mining or pastoral districts. Notice the position of the ports of Cairns, Townsville, and Rockhampton opposite gaps or passes through the mountains.

## TASMANIA

Tasmania is a small island about the same size as Scotland or Ireland, lying south of Australia. Physically it is a mass of mountains and hills with small fertile valleys. In the highlands of the north-west are some important mineral deposits—copper, silver, lead, gold, and tin—notably at Mt. Lyell, Mt. Zeehan, and Mt. Bischoff. It has a healthy temperate climate, somewhat like that of North-Western Europe, and in the valleys and on the level tracts of the east wheat, barley, and fruits are grown. Tasmanian apples are particularly fine. Much of the higher land is forested. The principal town is *Hobart*; *Launceston* is the chief port.

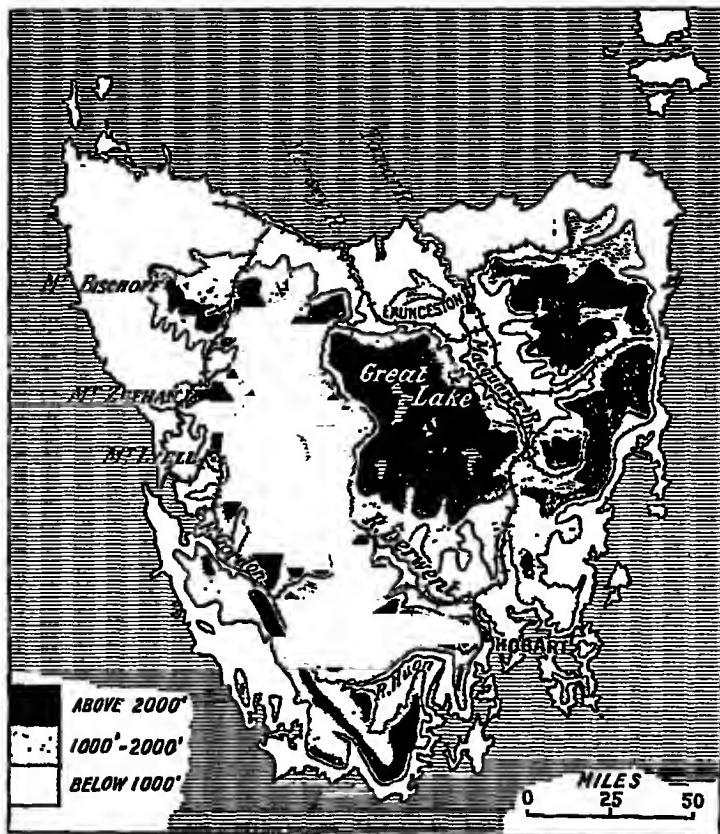


FIG. 412.—Tasmania.

## NEW ZEALAND

The Dominion of New Zealand consists of two large islands and a number of smaller islands in the South Pacific Ocean. Its area is 103,285 square miles—rather less than the British Isles. Running through the two main islands is a mountain backbone. In the South Island the backbone (Southern Alps) is near the west coast and

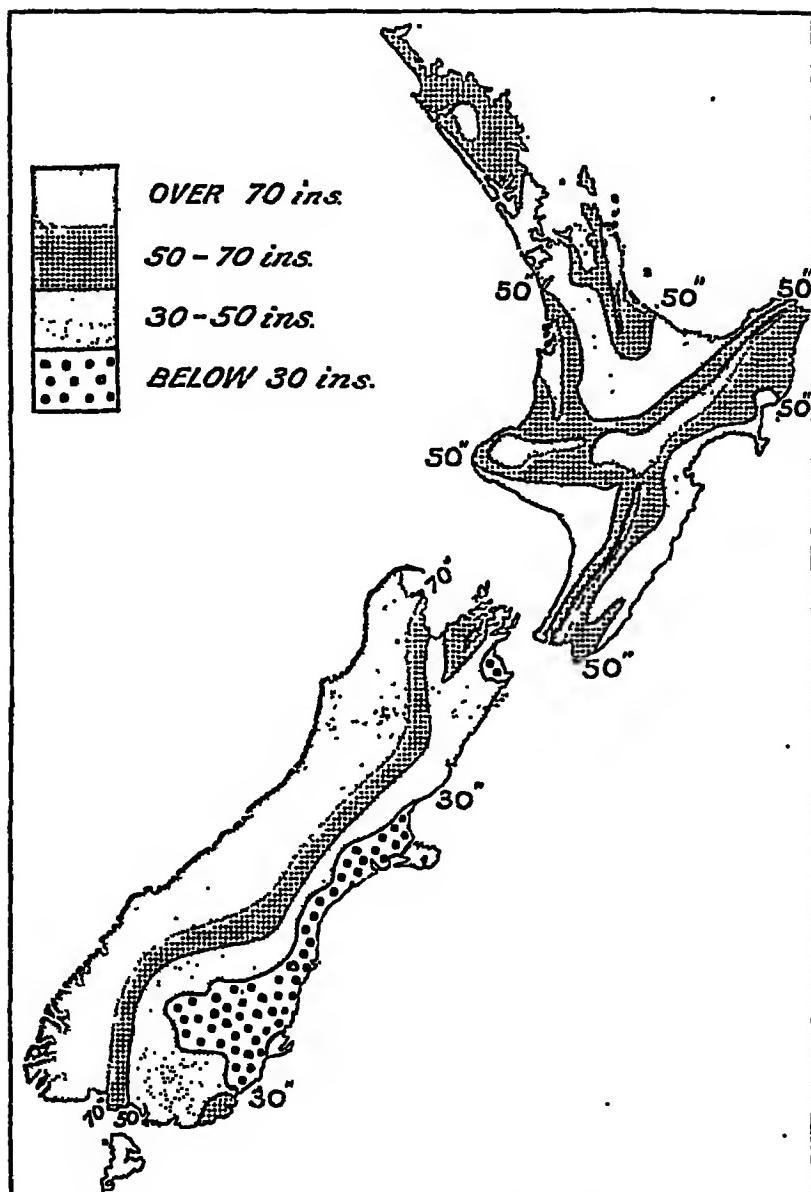


FIG. 413.—Rainfall map of New Zealand.

Notice that no part of the Dominion is really dry. Contrast Australia.

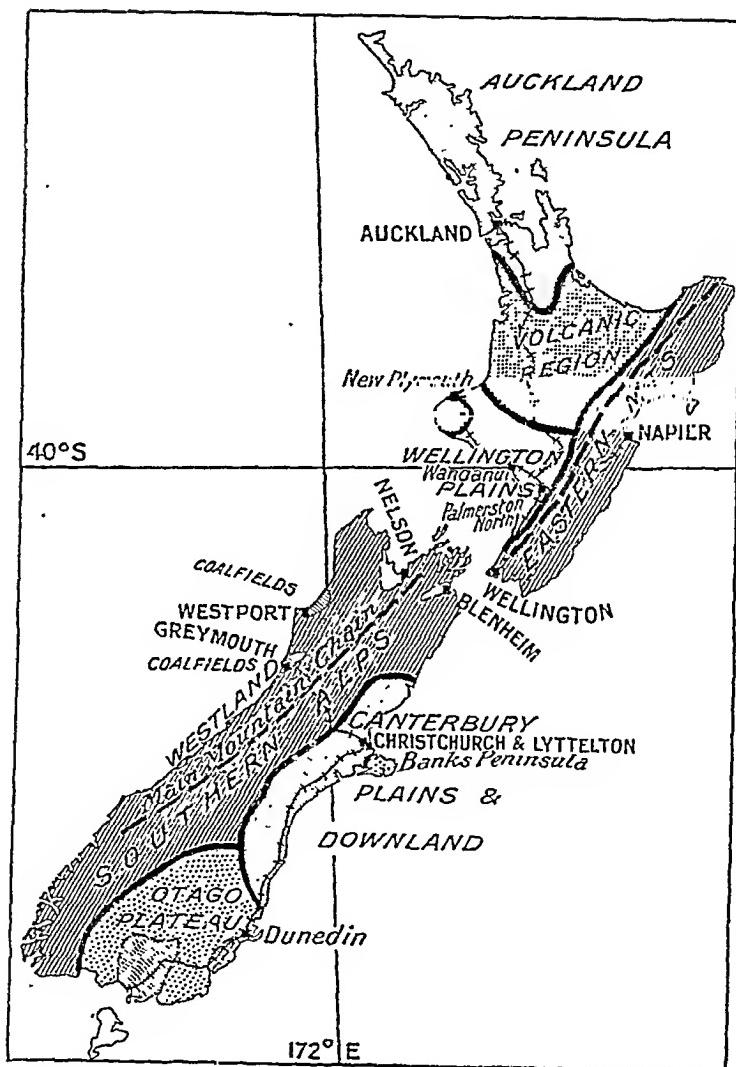


FIG. 414.—The physical features and natural regions of New Zealand.  
The more important plains which lie amongst the mountains or plateau lands are separately shown.

the plains are on the east; in the North Island the backbone is nearer the east and the plains are on the west. This has a tremendous effect on the climate, especially as the mountains in the South Island are so high (up to 12,000 feet in Mount Cook) that they are always covered with snow. In the Northern Island there is a large central area of volcanic rocks and several isolated volcanoes.

**Climate.**—Except perhaps at the extreme northern end, which is in the same latitude as Spain and has an almost Mediterranean climate, the whole of New Zealand falls in the

E Westerly Wind Belt. Hence there is a heavy rainfall on the west of the islands and a low rainfall on the east. Compare the rainfall of the British Isles, and compare the effect of the Southern Alps and the Pennines.

#### Natural Regions.

—(a) *The Mountains of the South Island.*—Most of the region with heavy rainfall—unless it is too high—is forested;

mountain pastures suitable for sheep occur in places, and especially in the drier parts to the north-east. Mining is not now an important occupation, though gold occurs as well as coal, copper, and New Zealand greenstone. The coal is obtained mainly in the vicinity of Westport and Greymouth, on the west coast.

(b) *The Grasslands of the South Island.*—In the south grass covers much of the Otago Plateau and, although somewhat poor, supports large numbers of sheep. Oats are grown. Notice the association of oats with poorer colder land and wheat with warmer richer land, and

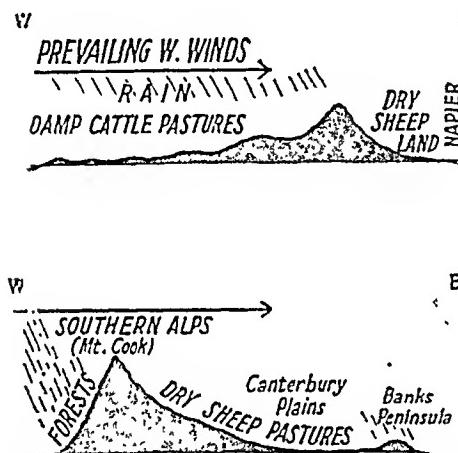


FIG. 415.—Sections across the North Island and South Island of New Zealand.

compare Scotland and England. This district is served by the port of Dunedin. The Canterbury Plains and Downland, farther north along the east coast, are the richest part of the South Island. In the old days sheep

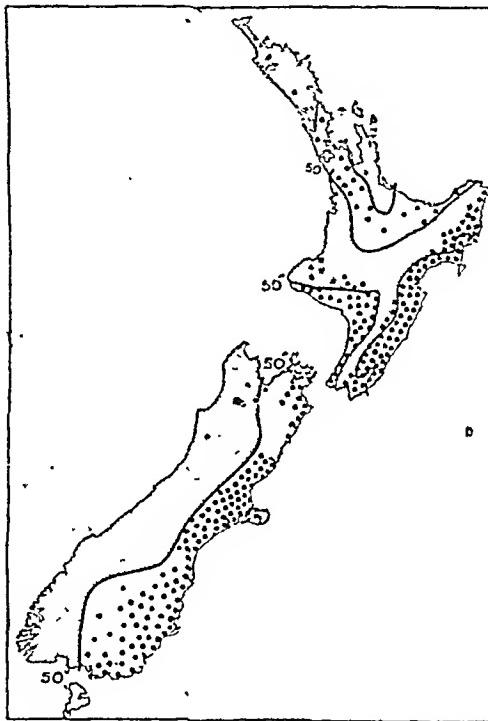


FIG 416.—The distribution of sheep in New Zealand.

Each dot represents 100,000 sheep in 1925. Notice that nearly all the sheep are found where the rainfall is less than 50 inches.

were kept for the sake of their wool, but now huge quantities of frozen lamb and mutton are sent to Britain, and sheep producing both good wool and good mutton require to be fed on good grass. As a result, much of the grass now grown is of best English kinds. Wheat and garden produce are grown. The principal town in this

region is *Christchurch*; eight miles away is its port, *Lyttelton*. Near Christchurch is the fertile Banks Peninsula, producing some of the butter and cheese for which New Zealand is now famous.

Special mention must be made of the sheltered lands around Tasman Bay (centre, Nelson) and Marlborough Province (centre, Blenheim) at the northern end of the South Island.

(c) *The Mountains of the North Island*.—Here the mountains are lower and on the drier side of the island.

This region is very varied but has much downland suitable for sheep. *Napier* is the port serving this region.

(d) *The Auckland Peninsula*.—This narrow peninsula enjoys a warm, almost Mediterranean climate, and fruits such as the vine, orange, and lemon can be grown. Grass suitable for cattle will grow well, and this is one of the great dairy-farming areas. Forests of Kauri pine occur in this region, and the collecting of gum from these trees is an important industry. Gold is also found.

FIG. 417.—The distribution of the dairy-farming industry in New Zealand.

*Auckland*, the largest town in New Zealand, is situated on a very narrow part of the peninsula and so commands both coasts, but the good harbour is on the east side. It is a port of call for steamers between Australia and America—especially from Sydney to Vancouver.

(e) *The Volcanic Regions of the North Island*.—In the centre of this region hot springs and geysers occur, and it is not long since volcanoes were active. Earthquakes are still common. The soils are often dry and poor, and it is only in the south that we find the fertile pasture lands characteristic of volcanic soils.



(f) *The Wellington Plains* occur to the south of the volcanic region and form one of the chief dairying regions. New Plymouth, Wanganui, and Palmerston North are centres of the dairying industry. Wellington, the capital of New Zealand, lies at the southern end of the mountains of the North Island and to the south of the dairying region.

**Trade and Communications.**—What we said about the trade of Australia applies almost exactly to New Zealand. New Zealand lamb, wool, butter, and cheese are much in demand in England and always of a good quality. The quality of the butter and cheese compares more than

WOOL	BUTTER	MEAT	CHEESE	OTHERS
IRON & STEEL & MACHINERY	CLOTHES & COTTON GOODS	PETROLEUM SUGAR	OTHERS	

FIG. 418.—The trade of New Zealand.

Total value of the trade is about £90,000,000, exports being usually in excess of imports.

favourably with that of Danish products. The four staple exports, wool, mutton, butter, and cheese, form the greater part of the trade. A very large proportion goes to Great Britain *via* the Panama Canal. Eighty per cent. of the exports go to Great Britain, which supplies over fifty per cent. of the imports.

Notice the railways of New Zealand. Many of them have been constructed at much expense, and the longest tunnel in the British Empire goes through the Southern Alps and links the east and west coasts of South Island.

### NEW GUINEA

The large island of New Guinea is situated in the Equatorial region, and the lowlands are covered with hot

wet evergreen forests. The interior is occupied by a plateau, said to be covered with dense tropical grassland.

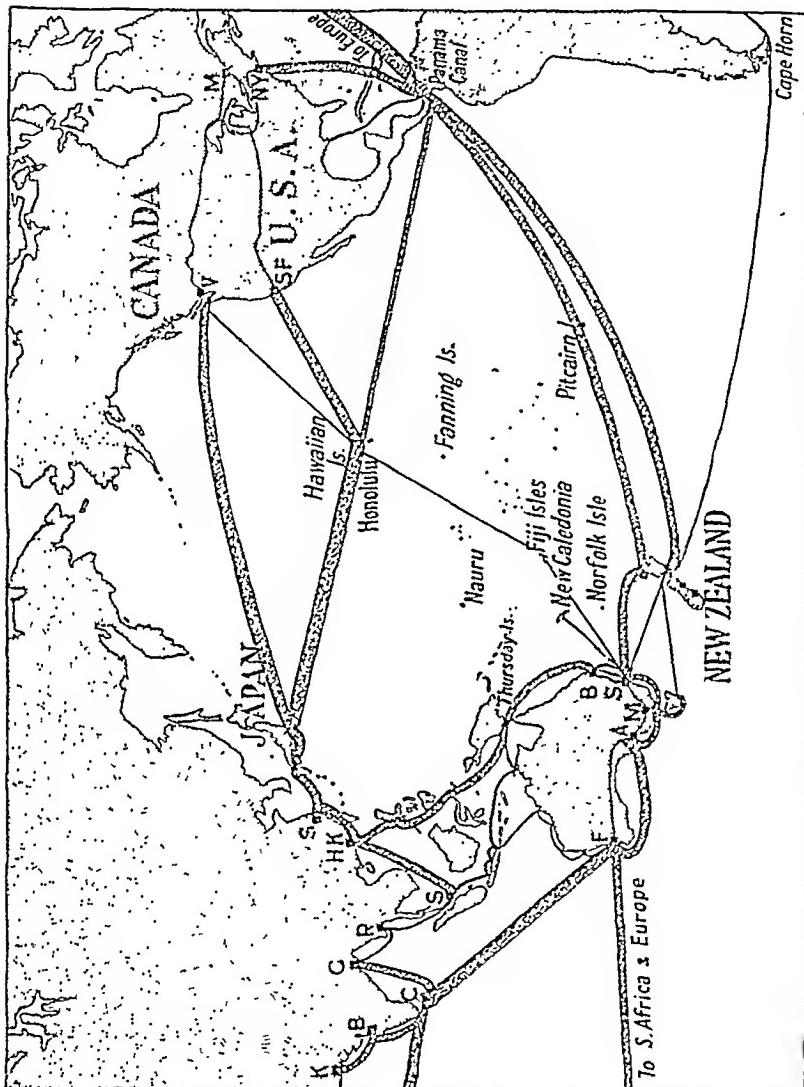


FIG. 419.—Trade routes of the Pacific Ocean.

The inhabitants of New Guinea are wild cannibal tribes, and the interior of the island is still little known. The eastern half of the island is part of the British Empire,

the western half forms part of the Dutch Colonies of the East Indies.

### PACIFIC ISLANDS

Scattered over the surface of the Pacific Ocean are enormous numbers of small islands. Most of them are coral islands, or volcanic islands surrounded by a coral reef. Coconuts flourish on nearly all the islands and are sometimes the only large plants. The following are some of the more important groups :

#### ISLANDS ADMINISTERED BY NEW ZEALAND

The former German Islands of Western Samoa are administered by New Zealand, and export copra and cacao beans. The Cook Islands, attached to New Zealand in 1901, have similar exports ; and so also the Union Group. Nauru or Pleasant Island is important owing to the rich deposits of phosphate, sent to Great Britain, Australia, and New Zealand.

#### THE HAWAIIAN ISLANDS

belong to the United States. The principal town, Honolulu, is now a large city and an important port of call for ocean liners crossing the Pacific. The islands are famous for their pineapple plantations ; the tinning and export of pineapples is now a large industry. There is a famous active volcano, Mauna Loa, on one of the islands, and on its flanks is a subsidiary volcano (Kilauea) of which the crater is occupied by a lake of molten lava which can actually be visited and studied.

#### THE FIJI ISLANDS

belong to the British Empire, and lie on the trade routes between Australia and New Zealand on the one side and Canada and the United States on the other.

### NEW CALEDONIA

is a French possession, formerly used as a convict settlement. It has large deposits of nickel ore.

Some of the tiny islands of the Pacific are used as "signal stations." They are equipped with wireless apparatus and pass on messages received from ships. Ships can only send their wireless messages for a certain distance, and so signal stations on land have to pass on the messages. Examples of islands used for this purpose are Thursday Island, Norfolk Island, Fanning Island (also cable stations), Ocean Island, etc. There are valuable phosphate deposits on Ocean Island.

### ANTARCTICA

The barren Antarctic continent consists probably of a high plateau of land, but is covered to a great depth by ice and snow. Under the name of the Ross Dependency a large sector has been placed under the Government of New Zealand. The whale fishing industry is one of great value in the territorial waters and is being exploited mainly by Norwegians under licence from the New Zealand Government.

### QUESTIONS AND EXERCISES

1. Write an account, with sketch-maps, of the mineral wealth of Australia.
2. Where is the monsoon region of Australia? How do you think this region might be developed?
3. Describe a journey round the coast of Australia.
4. Describe a journey across Australia from Perth to Brisbane. Draw sketch-maps to show the route taken.
5. Write a full account of sheep farming in Australia.
6. Compare and contrast the Murray-Darling Basin with that of the Ganges-Brahmaputra.
7. Draw sketch-maps to show the importance of the position of Melbourne, Auckland, and Port Darwin.
8. Give an account of the settlement and development of Australia.

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9. Compare and contrast New Zealand with (a) the British Isles,  
(b) Japan.
10. What do you know of the South Sea Islands?
11. Where are the following, and what is the importance of each : Darling Downs, Canterbury Plains, Riverina, Broken Hill, Cooper's Creek, Otago Plateau ?
12. How has the opening of the Panama Canal affected Australia and New Zealand ?

## APPENDIX

### EXAMINATION PAPERS AND GENERAL QUESTIONS

Mainly taken from Anglo-Vernacular (A.V.) and English (E.) High School and Middle Scholarship (H.S. or M.S.) Examinations of the Provinces of India. Some from University College Rangoon Junior Intermediate (U.C.R.J.I.) and University of Rangoon Intermediate Arts (U.R.I.A.). A large number of different additional questions will be found in Stamp's "How to teach Geography."

#### A. PHYSICAL

1. How is rainfall measured, and how is a rainfall map constructed ? Illustrate your answer by drawing and explaining a rainfall sketch-map of any actual country. (A.V., H.S., Bur., 1925.)
2. Write a brief account of the climate of either the Temperate Grasslands or the Equatorial Forests and indicate where the climate you describe is found. (A.V., H.S., Bur., 1925.)
3. Write a brief account of what you think the Arctic Ocean looks like throughout the year. (A.V., H.S., Bur., 1925.)
4. What is a contour line ? Draw a contoured map of an island showing a peak 800 feet high, a bay on the North with cliffs 200 feet high, a pass, and a coastal plain. (A.V., H.S., Bur., 1925.)
5. How are mountains formed ? Give examples and diagrams where possible. (A.V., H.S., Bur., 1925.)
6. "Man's character and occupation have been decided by the geographical conditions under which he lives." Illustrate this with reference to Englishmen and Burmans. (A.V., H.S., Bur., 1925.)
7. How is temperature measured and recorded ? What is meant by an isotherm map ? (A.V., H.S., Bur., 1926.)
8. Give a brief account of the main wind systems of the earth, noting the causes of the winds and of their variation from one part of the year to another. (A.V., H.S., Bur., 1926.)
9. If the time in Rangoon is 3 o'clock in the afternoon, what will be the time at a place  $30^{\circ}$  east of Rangoon ? Also what would be the time at a place  $30^{\circ}$  south of Rangoon ? Also at a place  $45^{\circ}$  west of Rangoon ? Account for these differences. (A.V., H.S., Bur., 1926.)

10. In what different ways may lakes be formed? Give an example of each type you mention. (A.V., H.S., Bur., 1926.)

11. Near the coast of a certain land there is a mountain system consisting of *three* parallel ranges. The outer range is about 1500 feet high; the middle one 2000 feet high; the inner one 3000 feet high. Between the outer range and the sea is a narrow coastal plain. Between the outer and middle ranges is a valley whose bottom is 1000 feet above sea-level. Between the middle and inner ranges is a valley whose bottom is 1500 feet above sea-level. Behind the inner range is a plateau averaging 2000 feet above sea-level. Draw as accurately as you can a section through the country from the sea to the plateau. (A.V., H.S., Bur., 1926.)

12. What is meant by Monsoons and how are they caused? Discuss the above with special reference to India. Define a cyclone.

13. What are the different types of currents and how do they originate? Illustrate the main warm currents on a sketch-map of the world. How do they influence the climate of the neighbouring countries in each case?

14. Explain any five of the following, giving examples and sketches wherever necessary:

Weathering, earth-pillar, sand dune, terminal moraine, continental shelf, artesian well, spring tide.

15. Describe the wind systems of the world with diagrams, giving their causes and effects. How do they affect the climatic conditions of South America?

16. Describe the work of running water as an agent of denudation, transport, and deposition. Compare and contrast the work of a river with that of a glacier.

17. Explain carefully and in detail why the captain of a ship takes a chronometer (accurate clock) with him when he goes to sea, and also why he takes a sextant. (A.V., H.S., Bur., 1924.)

18. What is an isotherm? Explain how an annual isotherm chart is constructed, stating what observations have to be made. On such a chart of the world it is noticed that the isotherms run approximately in the direction of the parallels of latitude. Explain this fact, and state (with reasons) any marked exception to it that you know of. (A.V., H.S., Bur., 1924.)

19. Certain parts of the world have rain in winter but very little or no rain in summer. Name these parts of the world, and explain fully why their rainfall is thus distributed. (A.V., H.S., Bur., 1920.)

20. Certain coasts in the world are deserts. Name them, and taking each one separately explain why desert conditions prevail. (A.V., H.S., Bur., 1924.)

21. Draw a contoured map (imaginary) of an easy pass from a town at 220 feet over a ridge about 500 feet high to the coast on the other side. How high is your pass? (A.V., H.S., Bur., 1924.)

22. Describe fully the cause, nature, position, and effects of two ocean currents which have a marked influence on the climate of the countries whose shores they wash. (U.C.R.J.I., 1926.)

23. What are sedimentary rocks? In what different ways may they be formed, and how do they come to form part of the land masses? (U.C.R.J.I., 1926.)

24. Describe carefully the conditions necessary for the growth of three important food grains of the world, and give a brief account of their distribution. (U.C.R.J.I., 1926.)

### B. GENERAL AND ECONOMIC

1. South-East Australia has a heavy rainfall. How has it benefited this part more than other parts of Australia? (A.V., M.S., Bur., 1924.)

2. Draw a sketch-map of Australia showing the rivers and mountains. Mark those areas which have no rivers reaching the sea. Why is it a disadvantage that so much of Australia is an area of inland drainage? (A.V., M.S., Bur., 1924.)

3. What has made Rangoon a great trading town? Name some countries which trade with Rangoon, and the articles in which they trade. (A.V., M.S., Bur., 1924.)

4. India is a part of the British Empire. Name some other parts of the British Empire. Point out how India helps them and is helped by them. (A.V., M.S., Bur., 1924.)

5. A traveller from Adelaide wants to go to England. By what different routes can he make that journey? Which route should he choose if he wants to reach England in the shortest time? (A.V., M.S., Bur., 1924.)

6. If you take a coastal trip from Rangoon to Singapore, what important ports will you pass? Describe the industries in which people are engaged at each one. (A.V., M.S., Bur., 1924.)

7. The trade of Burma consists of two kinds—

(1) Trade between different parts of Burma.

(2) Trade between Burma and other countries.

Write about these two kinds of trade using the headings—

(a) Things produced in the Dry Zone Region which are sent to other parts of Burma—how they are sent—towns engaged in this trade.

(b) Things produced in the Delta Region of Burma which are sent to other parts of Burma—how they are sent—towns engaged in this trade.

(c) Things produced in Burma which are sent to other countries—how they are sent—towns engaged in this trade—things received in return. (A.V., M.S., Bur., 1925.)

8. Write an account of "the occupations of the people of Australia" using the headings—

(1) Sheep-rearing—where it is carried on—the difficulties the people have to deal with—what products are obtained from the sheep and sold.

(2) Crops grown—names of things grown and where they are grown.

(3) Minerals—names of minerals—where they are found.

Illustrate your answer with a sketch-map if you can. (A.V., M.S., Bur., 1925.)

9. Divide Burma into natural regions, giving reasons for your divisions. (A.V., H.S., Bur., 1926.)

10. Describe the physical features, climate, and vegetation of the Ganges Basin. (A.V., H.S., Bur., 1926.)

11. Compare and contrast Victoria and New South Wales with the Cape Province of the Union of South Africa. (A.V., H.S., Bur., 1926.)
12. Draw a sketch-map showing the principal physical features of South America. Put in at least one line of longitude and two of latitude. (A.V., H.S., Bur., 1926.)
13. Write brief notes on each of the following cities, noting especially the reasons for their having become the capitals of their respective countries : London, Paris, Madrid, Vienna, Buenos Aires, and Canberra. (A.V., H.S., Bur., 1926.)
14. Why is there an industrial region in the north-eastern part of the United States ? What are the chief industries carried on there ? (A.V., H.S., Bur., 1926.)
15. What food grains are grown in India and Burma ? Show by sketch-maps where they are grown ; indicating from which regions and by what routes the surplus, if any, is exported. (A.V., H.S., Bur., 1926.)
16. What are our chief imports from the British Isles ? Where in the British Isles are they produced ? (A.V., H.S., Bur., 1926.)
17. If you were forced to leave Burma (or India) for good, in what country would you settle, why would you choose it, and what would you do there ? (A.V., H.S., Bur., 1926.)
18. Show by a sketch-map the more important railways of either India or South Africa. (A.V., H.S., Bur., 1925.)
19. What do you understand by the hinterland of a port ? Show by reference to ports in Burma how the richness and size of the hinterland influence the importance of the port. (A.V., H.S., Bur., 1925.)
20. Give a description of the route taken by the Canadian Pacific Railway, mentioning the natural regions through which it passes. Point out its commercial importance. (A.V., H.S., Bur., 1925.)
21. Compare and contrast the position, size, climate, and general physical structure of the British Isles and Japan. (A.V., H.S., Bur., 1925.)
22. Draw a sketch-map of either France or Australia, marking mountains, plateaux, over 1000 feet, and principal rivers. (A.V., H.S., Bur., 1925.)
23. What conditions generally determine a good harbour ? How far do these conditions hold good in the case of Rangoon, Bombay, Madras, and Dunedin ? (A.V., H.S., Bur., 1925.)
24. Describe the natural productions of the equatorial forests and give an account of their commercial exploitation. (A.V., H.S., Bur., 1925.)
25. Say what you can of the foreign overland trade of India and Burma, and illustrate your answer with a sketch-map. (A.V., H.S. Bur., 1925.)
26. Account for the position and importance of Constantinople, Riga, and Trieste. (A.V., H.S., Bur., 1925.)
27. Describe the caravan trade of North Africa. (A.V., H.S., Bur., 1925.)
28. Give an account of the productions, commerce, and trade-connections of Poland. (A.V., H.S., Bur., 1925.)
29. "He that rules the sea rules the commerce of the world."

Illustrate the truth of this statement, with reference to England. (A.V., M.S., Bur., 1925.)

30. Write an account of the productions of India, using these headings—

- (1) Crops used for food—where they are grown.
- (2) Crops not used for food—where they are grown.
- (3) Minerals—names of minerals found—where each is found.
- (4) What happens to the crops which are grown for food.
- (5) What the crops which are not eaten are used for.

Illustrate your answer with a map if you can. (A.V., M.S., Bur., 1925.)

31. Describe a journey from Rangoon to London using these headings—

- (1) What cargo is put into the steamer at Rangoon—where each thing comes from—where it is going to.
- (2) Stopping places on the way—number of days between each port, and total number of days spent on the journey.
- (3) What new cargo is taken on at each stopping place.
- (4) The journey takes place in December. What differences would the passengers notice if they travelled in August. (A.V., M.S., Bur., 1925.)

32. Write an account of either the people who live in the cold forests of Russia and Northern Siberia, or the Kafirs who live in the grasslands of South Africa, using the headings—

- (1) Where they live—climatic and other conditions.
- (2) The houses they live in—their clothes—their food.
- (3) Their occupations—brief description of how they carry them on.
- (4) How they travel.

Illustrate your answer, if you can, with drawings of their houses, weapons, and anything else interesting. (A.V., M.S., Bur., 1925.)

33. Why are wheat, cotton, jute, and tea not grown in Lower Burma? Name the countries where they are produced. (A.V., M.S., Bur., 1924.)

34. What and where are the following?

Bristol; Perth; Ava; Pretoria; Chicago; Montreal; Benares; Suez; Malta; Perim. (A.V., M.S., Bur., 1924.)

35. Mountains run north and south. If they ran east and west what physical changes would have been the result? (A.V., M.S., Bur., 1924.)

36. Discuss briefly the factors which determine the natural regions of Canada, illustrating your answer by sketch-maps, and conclude your work by marking on an outline map of Canada its Natural Regions.

37. "There are regions with well-marked dry and rainy seasons, the latter occurring in the summer months. The usual vegetation is savannah, but in the wetter places such as the river sides there is forest. In the highlands also where there are relief rains, forest also occurs. On the grassy slopes cattle-rearing and agriculture can be carried on. Irrigation is sometimes necessary. Among the crops are maize, millet, cotton, and tropical fruits. These regions can be made very productive, and the higher-lying parts are suitable for European colonies."

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